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(54) Title: NOVEL NUCLEIC ACIDS AND POLYPEPTIDES

(57) Abstract: The present invention provides novel nucleic acids, novel polypeptide sequences encoded by these nucleic acids and uses thereof.



WO 01/53455 A2

## NOVEL NUCLEIC ACIDS AND POLYPEPTIDES

### 1. TECHNICAL FIELD

The present invention provides novel polynucleotides and proteins encoded by  
5 such polynucleotides, along with uses for these polynucleotides and proteins, for example  
in therapeutic, diagnostic and research methods.

### 2. BACKGROUND

Technology aimed at the discovery of protein factors (including e.g., cytokines,  
10 such as lymphokines, interferons, CSFs, chemokines, and interleukins) has matured  
rapidly over the past decade. The now routine hybridization cloning and expression  
cloning techniques clone novel polynucleotides "directly" in the sense that they rely on  
information directly related to the discovered protein (i.e., partial DNA/amino acid  
15 sequence of the protein in the case of hybridization cloning; activity of the protein in the  
case of expression cloning). More recent "indirect" cloning techniques such as signal  
sequence cloning, which isolates DNA sequences based on the presence of a now  
well-recognized secretory leader sequence motif, as well as various PCR-based or low  
stringency hybridization-based cloning techniques, have advanced the state of the art by  
20 making available large numbers of DNA/amino acid sequences for proteins that are  
known to have biological activity, for example, by virtue of their secreted nature in the  
case of leader sequence cloning, by virtue of their cell or tissue source in the case of  
PCR-based techniques, or by virtue of structural similarity to other genes of known  
biological activity.

Identified polynucleotide and polypeptide sequences have numerous applications  
25 in, for example, diagnostics, forensics, gene mapping; identification of mutations  
responsible for genetic disorders or other traits, to assess biodiversity, and to produce  
many other types of data and products dependent on DNA and amino acid sequences.

### 3. SUMMARY OF THE INVENTION

30 The compositions of the present invention include novel isolated polypeptides, novel  
isolated polynucleotides encoding such polypeptides, including recombinant DNA

molecules, cloned genes or degenerate variants thereof, especially naturally occurring variants such as allelic variants, antisense polynucleotide molecules, and antibodies that specifically recognize one or more epitopes present on such polypeptides, as well as hybridomas producing such antibodies.

5           The compositions of the present invention additionally include vectors, including expression vectors, containing the polynucleotides of the invention, cells genetically engineered to contain such polynucleotides and cells genetically engineered to express such polynucleotides.

10           The present invention relates to a collection or library of at least one novel nucleic acid sequence assembled from expressed sequence tags (ESTs) isolated mainly by sequencing by hybridization (SBH), and in some cases, sequences obtained from one or more public databases. The invention relates also to the proteins encoded by such polynucleotides, along with therapeutic, diagnostic and research utilities for these polynucleotides and proteins. These nucleic acid sequences are designated as SEQ ID NO:  
15   1-739. The polypeptides sequences are designated SEQ ID NO: 740-1478. The nucleic acids and polypeptides are provided in the Sequence Listing. In the nucleic acids provided in the Sequence Listing, A is adenosine; C is cytosine; G is guanine; T is thymine; and N is any of the four bases. In the amino acids provided in the Sequence Listing, \* corresponds to the stop codon.

20           The nucleic acid sequences of the present invention also include, nucleic acid sequences that hybridize to the complement of SEQ ID NO:1-739 under stringent hybridization conditions; nucleic acid sequences which are allelic variants or species homologues of any of the nucleic acid sequences recited above, or nucleic acid sequences that encode a peptide comprising a specific domain or truncation of the peptides encoded by  
25   SEQ ID NO:1-739. A polynucleotide comprising a nucleotide sequence having at least 90% identity to an identifying sequence of SEQ ID NO:1-739 or a degenerate variant or fragment thereof. The identifying sequence can be 100 base pairs in length.

          The nucleic acid sequences of the present invention also include the sequence information from the nucleic acid sequences of SEQ ID NO:1-739. The sequence  
30   information can be a segment of any one of SEQ ID NO:1-739 that uniquely identifies or represents the sequence information of SEQ ID NO:1-739.

A collection as used in this application can be a collection of only one polynucleotide. The collection of sequence information or identifying information of each sequence can be provided on a nucleic acid array. In one embodiment, segments of sequence information is provided on a nucleic acid array to detect the polynucleotide that contains the segment. The array can be designed to detect full-match or mismatch to the polynucleotide that contains the segment. The collection can also be provided in a computer-readable format.

This invention also includes the reverse or direct complement of any of the nucleic acid sequences recited above; cloning or expression vectors containing the nucleic acid sequences; and host cells or organisms transformed with these expression vectors. Nucleic acid sequences (or their reverse or direct complements) according to the invention have numerous applications in a variety of techniques known to those skilled in the art of molecular biology, such as use as hybridization probes, use as primers for PCR, use in an array, use in computer-readable media, use in sequencing full-length genes, use for chromosome and gene mapping, use in the recombinant production of protein, and use in the generation of anti-sense DNA or RNA, their chemical analogs and the like.

In a preferred embodiment, the nucleic acid sequences of SEQ ID NO:1-739 or novel segments or parts of the nucleic acids of the invention are used as primers in expression assays that are well known in the art. In a particularly preferred embodiment, the nucleic acid sequences of SEQ ID NO:1-739 or novel segments or parts of the nucleic acids provided herein are used in diagnostics for identifying expressed genes or, as well known in the art and exemplified by Vollrath et al., *Science* 258:52-59 (1992), as expressed sequence tags for physical mapping of the human genome.

The isolated polynucleotides of the invention include, but are not limited to, a polynucleotide comprising any one of the nucleotide sequences set forth in SEQ ID NO:1-739; a polynucleotide comprising any of the full length protein coding sequences of SEQ ID NO:1 - 739; and a polynucleotide comprising any of the nucleotide sequences of the mature protein coding sequences of SEQ ID NO: 1- 739. The polynucleotides of the present invention also include, but are not limited to, a polynucleotide that hybridizes under stringent hybridization conditions to (a) the complement of any one of the nucleotide sequences set forth in SEQ ID NO:1-739; (b) a nucleotide sequence encoding any one of the



amino acid sequences set forth in the Sequence Listing; (c) a polynucleotide which is an allelic variant of any polynucleotides recited above; (d) a polynucleotide which encodes a species homolog (e.g. orthologs) of any of the proteins recited above; or (e) a polynucleotide that encodes a polypeptide comprising a specific domain or truncation of any of the polypeptides comprising an amino acid sequence set forth in the Sequence Listing.

The isolated polypeptides of the invention include, but are not limited to, a polypeptide comprising any of the amino acid sequences set forth in the Sequence Listing; or the corresponding full length or mature protein. Polypeptides of the invention also include polypeptides with biological activity that are encoded by (a) any of the polynucleotides having a nucleotide sequence set forth in SEQ ID NO:1-739; or (b) polynucleotides that hybridize to the complement of the polynucleotides of (a) under stringent hybridization conditions. Biologically or immunologically active variants of any of the polypeptide sequences in the Sequence Listing, and "substantial equivalents" thereof (e.g., with at least about 65%, 70%, 75%, 80%, 85%, 90%, 95%, 98% or 99% amino acid sequence identity) that preferably retain biological activity are also contemplated. The polypeptides of the invention may be wholly or partially chemically synthesized but are preferably produced by recombinant means using the genetically engineered cells (e.g. host cells) of the invention.

The invention also provides compositions comprising a polypeptide of the invention. Polypeptide compositions of the invention may further comprise an acceptable carrier, such as a hydrophilic, e.g., pharmaceutically acceptable, carrier.

The invention also provides host cells transformed or transfected with a polynucleotide of the invention.

The invention also relates to methods for producing a polypeptide of the invention comprising growing a culture of the host cells of the invention in a suitable culture medium under conditions permitting expression of the desired polypeptide, and purifying the polypeptide from the culture or from the host cells. Preferred embodiments include those in which the protein produced by such process is a mature form of the protein.

Polynucleotides according to the invention have numerous applications in a variety of techniques known to those skilled in the art of molecular biology. These techniques include use as hybridization probes, use as oligomers, or primers, for PCR, use for chromosome and gene mapping, use in the recombinant production of protein,

and use in generation of anti-sense DNA or RNA, their chemical analogs and the like. For example, when the expression of an mRNA is largely restricted to a particular cell or tissue type, polynucleotides of the invention can be used as hybridization probes to detect the presence of the particular cell or tissue mRNA in a sample using, *e.g.*, *in situ* hybridization.

In other exemplary embodiments, the polynucleotides are used in diagnostics as expressed sequence tags for identifying expressed genes or, as well known in the art and exemplified by Vollrath et al., Science 258:52-59 (1992), as expressed sequence tags for physical mapping of the human genome.

The polypeptides according to the invention can be used in a variety of conventional procedures and methods that are currently applied to other proteins. For example, a polypeptide of the invention can be used to generate an antibody that specifically binds the polypeptide. Such antibodies, particularly monoclonal antibodies, are useful for detecting or quantitating the polypeptide in tissue. The polypeptides of the invention can also be used as molecular weight markers, and as a food supplement.

Methods are also provided for preventing, treating, or ameliorating a medical condition which comprises the step of administering to a mammalian subject a therapeutically effective amount of a composition comprising a polypeptide of the present invention and a pharmaceutically acceptable carrier.

In particular, the polypeptides and polynucleotides of the invention can be utilized, for example, in methods for the prevention and/or treatment of disorders involving aberrant protein expression or biological activity.

The present invention further relates to methods for detecting the presence of the polynucleotides or polypeptides of the invention in a sample. Such methods can, for example, be utilized as part of prognostic and diagnostic evaluation of disorders as recited herein and for the identification of subjects exhibiting a predisposition to such conditions. The invention provides a method for detecting the polynucleotides of the invention in a sample, comprising contacting the sample with a compound that binds to and forms a complex with the polynucleotide of interest for a period sufficient to form the complex and under conditions sufficient to form a complex and detecting the complex such that if a complex is detected, the polynucleotide of interest is detected. The

invention also provides a method for detecting the polypeptides of the invention in a sample comprising contacting the sample with a compound that binds to and forms a complex with the polypeptide under conditions and for a period sufficient to form the complex and detecting the formation of the complex such that if a complex is formed, the polypeptide is detected.

The invention also provides kits comprising polynucleotide probes and/or monoclonal antibodies, and optionally quantitative standards, for carrying out methods of the invention. Furthermore, the invention provides methods for evaluating the efficacy of drugs, and monitoring the progress of patients, involved in clinical trials for the treatment of disorders as recited above.

The invention also provides methods for the identification of compounds that modulate (i.e., increase or decrease) the expression or activity of the polynucleotides and/or polypeptides of the invention. Such methods can be utilized, for example, for the identification of compounds that can ameliorate symptoms of disorders as recited herein. Such methods can include, but are not limited to, assays for identifying compounds and other substances that interact with (*e.g.*, bind to) the polypeptides of the invention. The invention provides a method for identifying a compound that binds to the polypeptides of the invention comprising contacting the compound with a polypeptide of the invention in a cell for a time sufficient to form a polypeptide/compound complex, wherein the complex drives expression of a reporter gene sequence in the cell; and detecting the complex by detecting the reporter gene sequence expression such that if expression of the reporter gene is detected the compound the binds to a polypeptide of the invention is identified.

The methods of the invention also provides methods for treatment which involve the administration of the polynucleotides or polypeptides of the invention to individuals exhibiting symptoms or tendencies. In addition, the invention encompasses methods for treating diseases or disorders as recited herein comprising administering compounds and other substances that modulate the overall activity of the target gene products. Compounds and other substances can effect such modulation either on the level of target gene/protein expression or target protein activity.

The polypeptides of the present invention and the polynucleotides encoding them are also useful for the same functions known to one of skill in the art as the polypeptides and polynucleotides to which they have homology (set forth in Table 2). If no homology is set forth for a sequence, then the polypeptides and polynucleotides of the present invention are useful for a variety of applications, as described herein, including use in arrays for detection.

#### 4. DETAILED DESCRIPTION OF THE INVENTION

##### 4.1 DEFINITIONS

It must be noted that as used herein and in the appended claims, the singular forms "a", "an" and "the" include plural references unless the context clearly dictates otherwise.

The term "active" refers to those forms of the polypeptide which retain the biologic and/or immunologic activities of any naturally occurring polypeptide. According to the invention, the terms "biologically active" or "biological activity" refer to a protein or peptide having structural, regulatory or biochemical functions of a naturally occurring molecule. Likewise "immunologically active" or "immunological activity" refers to the capability of the natural, recombinant or synthetic polypeptide to induce a specific immune response in appropriate animals or cells and to bind with specific antibodies.

The term "activated cells" as used in this application are those cells which are engaged in extracellular or intracellular membrane trafficking, including the export of secretory or enzymatic molecules as part of a normal or disease process.

The terms "complementary" or "complementarity" refer to the natural binding of polynucleotides by base pairing. For example, the sequence 5'-AGT-3' binds to the complementary sequence 3'-TCA-5'. Complementarity between two single-stranded molecules may be "partial" such that only some of the nucleic acids bind or it may be "complete" such that total complementarity exists between the single stranded molecules. The degree of complementarity between the nucleic acid strands has significant effects on the efficiency and strength of the hybridization between the nucleic acid strands.

The term "embryonic stem cells (ES)" refers to a cell that can give rise to many differentiated cell types in an embryo or an adult, including the germ cells. The term "germ line stem cells (GSCs)" refers to stem cells derived from primordial stem cells that provide a steady and continuous source of germ cells for the production of gametes. The  
5 term "primordial germ cells (PGCs)" refers to a small population of cells set aside from other cell lineages particularly from the yolk sac, mesenteries, or gonadal ridges during embryogenesis that have the potential to differentiate into germ cells and other cells. PGCs are the source from which GSCs and ES cells are derived. The PGCs, the GSCs and the ES cells are capable of self-renewal. Thus these cells not only populate the germ  
10 line and give rise to a plurality of terminally differentiated cells that comprise the adult specialized organs, but are able to regenerate themselves.

The term "expression modulating fragment," EMF, means a series of nucleotides which modulates the expression of an operably linked ORF or another EMF.

As used herein, a sequence is said to "modulate the expression of an operably  
15 linked sequence" when the expression of the sequence is altered by the presence of the EMF. EMFs include, but are not limited to, promoters, and promoter modulating sequences (inducible elements). One class of EMFs are nucleic acid fragments which induce the expression of an operably linked ORF in response to a specific regulatory factor or physiological event.

20 The terms "nucleotide sequence" or "nucleic acid" or "polynucleotide" or "oligonucleotide" are used interchangeably and refer to a heteropolymer of nucleotides or the sequence of these nucleotides. These phrases also refer to DNA or RNA of genomic or synthetic origin which may be single-stranded or double-stranded and may represent the sense or the antisense strand, to peptide nucleic acid (PNA) or to any DNA-like or  
25 RNA-like material. In the sequences herein A is adenine, C is cytosine, T is thymine, G is guanine and N is A, C, G or T (U). It is contemplated that where the polynucleotide is RNA, the T (thymine) in the sequences provided herein is substituted with U (uracil). Generally, nucleic acid segments provided by this invention may be assembled from fragments of the genome and short oligonucleotide linkers, or from a series of  
30 oligonucleotides, or from individual nucleotides, to provide a synthetic nucleic acid

which is capable of being expressed in a recombinant transcriptional unit comprising regulatory elements derived from a microbial or viral operon, or a eukaryotic gene.

The terms "oligonucleotide fragment" or a "polynucleotide fragment", "portion," or "segment" or "probe" or "primer" are used interchangeably and refer to a sequence of nucleotide residues which are at least about 5 nucleotides, more preferably at least about 7 nucleotides, more preferably at least about 9 nucleotides, more preferably at least about 11 nucleotides and most preferably at least about 17 nucleotides. The fragment is preferably less than about 500 nucleotides, preferably less than about 200 nucleotides, more preferably less than about 100 nucleotides, more preferably less than about 50 nucleotides and most preferably less than 30 nucleotides. Preferably the probe is from about 6 nucleotides to about 200 nucleotides, preferably from about 15 to about 50 nucleotides, more preferably from about 17 to 30 nucleotides and most preferably from about 20 to 25 nucleotides. Preferably the fragments can be used in polymerase chain reaction (PCR), various hybridization procedures or microarray procedures to identify or amplify identical or related parts of mRNA or DNA molecules. A fragment or segment may uniquely identify each polynucleotide sequence of the present invention. Preferably the fragment comprises a sequence substantially similar to any one of SEQ ID NOs:1-20.

Probes may, for example, be used to determine whether specific mRNA molecules are present in a cell or tissue or to isolate similar nucleic acid sequences from chromosomal DNA as described by Walsh et al. (Walsh, P.S. et al., 1992, PCR Methods Appl 1:241-250). They may be labeled by nick translation, Klenow fill-in reaction, PCR, or other methods well known in the art. Probes of the present invention, their preparation and/or labeling are elaborated in Sambrook, J. et al., 1989, Molecular Cloning: A Laboratory Manual, Cold Spring Harbor Laboratory, NY; or Ausubel, F.M. et al., 1989, Current Protocols in Molecular Biology, John Wiley & Sons, New York NY, both of which are incorporated herein by reference in their entirety.

The nucleic acid sequences of the present invention also include the sequence information from the nucleic acid sequences of SEQ ID NO:1-739. The sequence information can be a segment of any one of SEQ ID NO:1-739 that uniquely identifies or represents the sequence information of that sequence of SEQ ID NO:1-739. One such segment can be a twenty-mer nucleic acid sequence because the probability that a twenty-

mer is fully matched in the human genome is 1 in 300. In the human genome, there are three billion base pairs in one set of chromosomes. Because  $4^{20}$  possible twenty-mers exist, there are 300 times more twenty-mers than there are base pairs in a set of human chromosomes. Using the same analysis, the probability for a seventeen-mer to be fully  
5 matched in the human genome is approximately 1 in 5. When these segments are used in arrays for expression studies, fifteen-mer segments can be used. The probability that the fifteen-mer is fully matched in the expressed sequences is also approximately one in five because expressed sequences comprise less than approximately 5% of the entire genome sequence.

10 Similarly, when using sequence information for detecting a single mismatch, a segment can be a twenty-five mer. The probability that the twenty-five mer would appear in a human genome with a single mismatch is calculated by multiplying the probability for a full match ( $1/4^{25}$ ) times the increased probability for mismatch at each nucleotide position ( $3 \times 25$ ). The probability that an eighteen mer with a single mismatch can be detected in an  
15 array for expression studies is approximately one in five. The probability that a twenty-mer with a single mismatch can be detected in a human genome is approximately one in five.

The term "open reading frame," ORF, means a series of nucleotide triplets coding for amino acids without any termination codons and is a sequence translatable into protein.

20 The terms "operably linked" or "operably associated" refer to functionally related nucleic acid sequences. For example, a promoter is operably associated or operably linked with a coding sequence if the promoter controls the transcription of the coding sequence. While operably linked nucleic acid sequences can be contiguous and in the same reading frame, certain genetic elements e.g. repressor genes are not contiguously  
25 linked to the coding sequence but still control transcription/translation of the coding sequence.

The term "pluripotent" refers to the capability of a cell to differentiate into a number of differentiated cell types that are present in an adult organism. A pluripotent cell is restricted in its differentiation capability in comparison to a totipotent cell.

30 The terms "polypeptide" or "peptide" or "amino acid sequence" refer to an oligopeptide, peptide, polypeptide or protein sequence or fragment thereof and to

naturally occurring or synthetic molecules. A polypeptide "fragment," "portion," or "segment" is a stretch of amino acid residues of at least about 5 amino acids, preferably at least about 7 amino acids, more preferably at least about 9 amino acids and most preferably at least about 17 or more amino acids. The peptide preferably is not greater than about 200 amino acids, more preferably less than 150 amino acids and most preferably less than 100 amino acids. Preferably the peptide is from about 5 to about 200 amino acids. To be active, any polypeptide must have sufficient length to display biological and/or immunological activity.

The term "naturally occurring polypeptide" refers to polypeptides produced by cells that have not been genetically engineered and specifically contemplates various polypeptides arising from post-translational modifications of the polypeptide including, but not limited to, acetylation, carboxylation, glycosylation, phosphorylation, lipidation and acylation.

The term "translated protein coding portion" means a sequence which encodes for the full length protein which may include any leader sequence or any processing sequence.

The term "mature protein coding sequence" means a sequence which encodes a peptide or protein without a signal or leader sequence. The "mature protein portion" means that portion of the protein which does not include a signal or leader sequence. The peptide may have been produced by processing in the cell which removes any leader/signal sequence. The mature protein portion may or may not include the initial methionine residue. The methionine residue may be removed from the protein during processing in the cell. The peptide may be produced synthetically or the protein may have been produced using a polynucleotide only encoding for the mature protein coding sequence.

The term "derivative" refers to polypeptides chemically modified by such techniques as ubiquitination, labeling (e.g., with radionuclides or various enzymes), covalent polymer attachment such as pegylation (derivatization with polyethylene glycol) and insertion or substitution by chemical synthesis of amino acids such as ornithine, which do not normally occur in human proteins.



The term "variant"(or "analog") refers to any polypeptide differing from naturally occurring polypeptides by amino acid insertions, deletions, and substitutions, created using, *e g.*, recombinant DNA techniques. Guidance in determining which amino acid residues may be replaced, added or deleted without abolishing activities of interest, may  
5 be found by comparing the sequence of the particular polypeptide with that of homologous peptides and minimizing the number of amino acid sequence changes made in regions of high homology (conserved regions) or by replacing amino acids with consensus sequence.

Alternatively, recombinant variants encoding these same or similar polypeptides  
10 may be synthesized or selected by making use of the "redundancy" in the genetic code. Various codon substitutions, such as the silent changes which produce various restriction sites, may be introduced to optimize cloning into a plasmid or viral vector or expression in a particular prokaryotic or eukaryotic system. Mutations in the polynucleotide sequence may be reflected in the polypeptide or domains of other peptides added to the  
15 polypeptide to modify the properties of any part of the polypeptide, to change characteristics such as ligand-binding affinities, interchain affinities, or degradation/turnover rate.

Preferably, amino acid "substitutions" are the result of replacing one amino acid with another amino acid having similar structural and/or chemical properties, *i.e.*,  
20 conservative amino acid replacements. "Conservative" amino acid substitutions may be made on the basis of similarity in polarity, charge, solubility, hydrophobicity, hydrophilicity, and/or the amphipathic nature of the residues involved. For example, nonpolar (hydrophobic) amino acids include alanine, leucine, isoleucine, valine, proline, phenylalanine, tryptophan, and methionine; polar neutral amino acids include glycine,  
25 serine, threonine, cysteine, tyrosine, asparagine, and glutamine; positively charged (basic) amino acids include arginine, lysine, and histidine; and negatively charged (acidic) amino acids include aspartic acid and glutamic acid. "Insertions" or "deletions" are preferably in the range of about 1 to 20 amino acids, more preferably 1 to 10 amino acids. The variation allowed may be experimentally determined by systematically making insertions,  
30 deletions, or substitutions of amino acids in a polypeptide molecule using recombinant DNA techniques and assaying the resulting recombinant variants for activity.

Alternatively, where alteration of function is desired, insertions, deletions or non-conservative alterations can be engineered to produce altered polypeptides. Such alterations can, for example, alter one or more of the biological functions or biochemical characteristics of the polypeptides of the invention. For example, such alterations may  
5 change polypeptide characteristics such as ligand-binding affinities, interchain affinities, or degradation/turnover rate. Further, such alterations can be selected so as to generate polypeptides that are better suited for expression, scale up and the like in the host cells chosen for expression. For example, cysteine residues can be deleted or substituted with another amino acid residue in order to eliminate disulfide bridges.

10 The terms "purified" or "substantially purified" as used herein denotes that the indicated nucleic acid or polypeptide is present in the substantial absence of other biological macromolecules, *e.g.*, polynucleotides, proteins, and the like. In one embodiment, the polynucleotide or polypeptide is purified such that it constitutes at least 95% by weight, more preferably at least 99% by weight, of the indicated biological  
15 macromolecules present (but water, buffers, and other small molecules, especially molecules having a molecular weight of less than 1000 daltons, can be present).

The term "isolated" as used herein refers to a nucleic acid or polypeptide separated from at least one other component (*e.g.*, nucleic acid or polypeptide) present with the nucleic acid or polypeptide in its natural source. In one embodiment, the nucleic  
20 acid or polypeptide is found in the presence of (if anything) only a solvent, buffer, ion, or other component normally present in a solution of the same. The terms "isolated" and "purified" do not encompass nucleic acids or polypeptides present in their natural source.

The term "recombinant," when used herein to refer to a polypeptide or protein, means that a polypeptide or protein is derived from recombinant (*e.g.*, microbial, insect, or mammalian) expression systems. "Microbial" refers to recombinant polypeptides or  
25 proteins made in bacterial or fungal (*e.g.*, yeast) expression systems. As a product, "recombinant microbial" defines a polypeptide or protein essentially free of native endogenous substances and unaccompanied by associated native glycosylation. Polypeptides or proteins expressed in most bacterial cultures, *e.g.*, *E. coli*, will be free of  
30 glycosylation modifications; polypeptides or proteins expressed in yeast will have a glycosylation pattern in general different from those expressed in mammalian cells.

The term "recombinant expression vehicle or vector" refers to a plasmid or phage or virus or vector, for expressing a polypeptide from a DNA (RNA) sequence. An expression vehicle can comprise a transcriptional unit comprising an assembly of (1) a genetic element or elements having a regulatory role in gene expression, for example, promoters or enhancers, (2) a structural or coding sequence which is transcribed into mRNA and translated into protein, and (3) appropriate transcription initiation and termination sequences. Structural units intended for use in yeast or eukaryotic expression systems preferably include a leader sequence enabling extracellular secretion of translated protein by a host cell. Alternatively, where recombinant protein is expressed without a leader or transport sequence, it may include an amino terminal methionine residue. This residue may or may not be subsequently cleaved from the expressed recombinant protein to provide a final product.

The term "recombinant expression system" means host cells which have stably integrated a recombinant transcriptional unit into chromosomal DNA or carry the recombinant transcriptional unit extrachromosomally. Recombinant expression systems as defined herein will express heterologous polypeptides or proteins upon induction of the regulatory elements linked to the DNA segment or synthetic gene to be expressed. This term also means host cells which have stably integrated a recombinant genetic element or elements having a regulatory role in gene expression, for example, promoters or enhancers. Recombinant expression systems as defined herein will express polypeptides or proteins endogenous to the cell upon induction of the regulatory elements linked to the endogenous DNA segment or gene to be expressed. The cells can be prokaryotic or eukaryotic.

The term "secreted" includes a protein that is transported across or through a membrane, including transport as a result of signal sequences in its amino acid sequence when it is expressed in a suitable host cell. "Secreted" proteins include without limitation proteins secreted wholly (*e.g.*, soluble proteins) or partially (*e.g.*, receptors) from the cell in which they are expressed. "Secreted" proteins also include without limitation proteins that are transported across the membrane of the endoplasmic reticulum. "Secreted" proteins are also intended to include proteins containing non-typical signal sequences (*e.g.* Interleukin-1 Beta, see Krasney, P.A. and Young, P.R. (1992) Cytokine 4(2):134

-143) and factors released from damaged cells (e.g. Interleukin-1 Receptor Antagonist, see Arend, W.P. et. al. (1998) Annu. Rev. Immunol. 16:27-55)

Where desired, an expression vector may be designed to contain a "signal or leader sequence" which will direct the polypeptide through the membrane of a cell. Such a sequence may be naturally present on the polypeptides of the present invention or  
5 provided from heterologous protein sources by recombinant DNA techniques.

The term "stringent" is used to refer to conditions that are commonly understood in the art as stringent. Stringent conditions can include highly stringent conditions (i.e., hybridization to filter-bound DNA in 0.5 M NaHPO<sub>4</sub>, 7% sodium dodecyl sulfate (SDS),  
10 1 mM EDTA at 65°C, and washing in 0.1X SSC/0.1% SDS at 68°C), and moderately stringent conditions (i.e., washing in 0.2X SSC/0.1% SDS at 42°C). Other exemplary hybridization conditions are described herein in the examples.

In instances of hybridization of deoxyoligonucleotides, additional exemplary stringent hybridization conditions include washing in 6X SSC/0.05% sodium  
15 pyrophosphate at 37°C (for 14-base oligonucleotides), 48°C (for 17-base oligos), 55°C (for 20-base oligonucleotides), and 60°C (for 23-base oligonucleotides).

As used herein, "substantially equivalent" can refer both to nucleotide and amino acid sequences, for example a mutant sequence, that varies from a reference sequence by one or more substitutions, deletions, or additions, the net effect of which does not result  
20 in an adverse functional dissimilarity between the reference and subject sequences. Typically, such a substantially equivalent sequence varies from one of those listed herein by no more than about 35% (i.e., the number of individual residue substitutions, additions, and/or deletions in a substantially equivalent sequence, as compared to the corresponding reference sequence, divided by the total number of residues in the  
25 substantially equivalent sequence is about 0.35 or less). Such a sequence is said to have 65% sequence identity to the listed sequence. In one embodiment, a substantially equivalent, e.g., mutant, sequence of the invention varies from a listed sequence by no more than 30% (70% sequence identity); in a variation of this embodiment, by no more than 25% (75% sequence identity); and in a further variation of this embodiment, by no  
30 more than 20% (80% sequence identity) and in a further variation of this embodiment, by no more than 10% (90% sequence identity) and in a further variation of this embodiment,

by no more than 5% (95% sequence identity). Substantially equivalent, *e.g.*, mutant, amino acid sequences according to the invention preferably have at least 80% sequence identity with a listed amino acid sequence, more preferably at least 90% sequence identity. Substantially equivalent nucleotide sequences of the invention can have lower percent sequence identities, taking into account, for example, the redundancy or degeneracy of the genetic code. Preferably, nucleotide sequence has at least about 65% identity, more preferably at least about 75% identity, and most preferably at least about 95% identity. For the purposes of the present invention, sequences having substantially equivalent biological activity and substantially equivalent expression characteristics are considered substantially equivalent. For the purposes of determining equivalence, truncation of the mature sequence (*e.g.*, via a mutation which creates a spurious stop codon) should be disregarded. Sequence identity may be determined, *e.g.*, using the Jotun Hein method (Hein, J. (1990) *Methods Enzymol.* 183:626-645). Identity between sequences can also be determined by other methods known in the art, *e.g.* by varying hybridization conditions.

The term "totipotent" refers to the capability of a cell to differentiate into all of the cell types of an adult organism.

The term "transformation" means introducing DNA into a suitable host cell so that the DNA is replicable, either as an extrachromosomal element, or by chromosomal integration. The term "transfection" refers to the taking up of an expression vector by a suitable host cell, whether or not any coding sequences are in fact expressed. The term "infection" refers to the introduction of nucleic acids into a suitable host cell by use of a virus or viral vector.

As used herein, an "uptake modulating fragment," UMF, means a series of nucleotides which mediate the uptake of a linked DNA fragment into a cell. UMFs can be readily identified using known UMFs as a target sequence or target motif with the computer-based systems described below. The presence and activity of a UMF can be confirmed by attaching the suspected UMF to a marker sequence. The resulting nucleic acid molecule is then incubated with an appropriate host under appropriate conditions and the uptake of the marker sequence is determined. As described above, a UMF will increase the frequency of uptake of a linked marker sequence.

Each of the above terms is meant to encompass all that is described for each, unless the context dictates otherwise.

## 4.2 NUCLEIC ACIDS OF THE INVENTION

5 Nucleotide sequences of the invention are set forth in the Sequence Listing.

The isolated polynucleotides of the invention include a polynucleotide comprising the nucleotide sequences of SEQ ID NO:1-739 ; a polynucleotide encoding any one of the peptide sequences of SEQ ID NO:740-1478; and a polynucleotide comprising the nucleotide sequence encoding the mature protein coding sequence of the polypeptides of  
10 any one of SEQ ID NO:740-1478. The polynucleotides of the present invention also include, but are not limited to, a polynucleotide that hybridizes under stringent conditions to (a) the complement of any of the nucleotides sequences of SEQ ID NO:1-739 ; (b) nucleotide sequences encoding any one of the amino acid sequences set forth in the Sequence Listing; (c) a polynucleotide which is an allelic variant of any polynucleotide  
15 recited above; (d) a polynucleotide which encodes a species homolog of any of the proteins recited above; or (e) a polynucleotide that encodes a polypeptide comprising a specific domain or truncation of the polypeptides of SEQ ID NO: 740-1478. Domains of interest may depend on the nature of the encoded polypeptide; e.g., domains in receptor-like polypeptides include ligand-binding, extracellular, transmembrane, or cytoplasmic  
20 domains, or combinations thereof; domains in immunoglobulin-like proteins include the variable immunoglobulin-like domains; domains in enzyme-like polypeptides include catalytic and substrate binding domains; and domains in ligand polypeptides include receptor-binding domains.

The polynucleotides of the invention include naturally occurring or wholly or  
25 partially synthetic DNA, e.g., cDNA and genomic DNA, and RNA, e.g., mRNA. The polynucleotides may include all of the coding region of the cDNA or may represent a portion of the coding region of the cDNA.

The present invention also provides genes corresponding to the cDNA sequences disclosed herein. The corresponding genes can be isolated in accordance with known  
30 methods using the sequence information disclosed herein. Such methods include the preparation of probes or primers from the disclosed sequence information for identification

and/or amplification of genes in appropriate genomic libraries or other sources of genomic materials. Further 5' and 3' sequence can be obtained using methods known in the art. For example, full length cDNA or genomic DNA that corresponds to any of the polynucleotides of SEQ ID NO:1-739 can be obtained by screening appropriate cDNA or genomic DNA  
5 libraries under suitable hybridization conditions using any of the polynucleotides of SEQ ID NO:1-739 or a portion thereof as a probe. Alternatively, the polynucleotides of SEQ ID NO:1-739 may be used as the basis for suitable primer(s) that allow identification and/or amplification of genes in appropriate genomic DNA or cDNA libraries.

The nucleic acid sequences of the invention can be assembled from ESTs and  
10 sequences (including cDNA and genomic sequences) obtained from one or more public databases, such as dbEST, gbpri, and UniGene. The EST sequences can provide identifying sequence information, representative fragment or segment information, or novel segment information for the full-length gene.

The polynucleotides of the invention also provide polynucleotides including  
15 nucleotide sequences that are substantially equivalent to the polynucleotides recited above. Polynucleotides according to the invention can have, *e.g.*, at least about 65%, at least about 70%, at least about 75%, at least about 80%, more typically at least about 90%, and even more typically at least about 95%, sequence identity to a polynucleotide recited above.

20 Included within the scope of the nucleic acid sequences of the invention are nucleic acid sequence fragments that hybridize under stringent conditions to any of the nucleotide sequences of SEQ ID NO:1-739, or complements thereof, which fragment is greater than about 5 nucleotides, preferably 7 nucleotides, more preferably greater than 9 nucleotides and most preferably greater than 17 nucleotides. Fragments of, *e.g.* 15, 17, or  
25 20 nucleotides or more that are selective for (*i.e.* specifically hybridize to any one of the polynucleotides of the invention) are contemplated. Probes capable of specifically hybridizing to a polynucleotide can differentiate polynucleotide sequences of the invention from other polynucleotide sequences in the same family of genes or can differentiate human genes from genes of other species, and are preferably based on  
30 unique nucleotide sequences.

The sequences falling within the scope of the present invention are not limited to these specific sequences, but also include allelic and species variations thereof. Allelic and species variations can be routinely determined by comparing the sequence provided SEQ ID NO:1-739, a representative fragment thereof, or a nucleotide sequence at least 90% identical, preferably 95% identical, to SEQ ID NO:1-739 with a sequence from another isolate of the same species. Furthermore, to accommodate codon variability, the invention includes nucleic acid molecules coding for the same amino acid sequences as do the specific ORFs disclosed herein. In other words, in the coding region of an ORF, substitution of one codon for another codon that encodes the same amino acid is expressly contemplated.

The nearest neighbor or homology result for the nucleic acids of the present invention, including SEQ ID NO:1-739, can be obtained by searching a database using an algorithm or a program. Preferably, a BLAST which stands for Basic Local Alignment Search Tool is used to search for local sequence alignments (Altshul, S.F. J Mol. Evol. 36 290-300 (1993) and Altschul S.F. et al. J. Mol. Biol. 21:403-410 (1990)). Alternatively a FASTA version 3 search against Genpept, using Fastxy algorithm.

Species homologs (or orthologs) of the disclosed polynucleotides and proteins are also provided by the present invention. Species homologs may be isolated and identified by making suitable probes or primers from the sequences provided herein and screening a suitable nucleic acid source from the desired species.

The invention also encompasses allelic variants of the disclosed polynucleotides or proteins; that is, naturally-occurring alternative forms of the isolated polynucleotide which also encode proteins which are identical, homologous or related to that encoded by the polynucleotides.

The nucleic acid sequences of the invention are further directed to sequences which encode variants of the described nucleic acids. These amino acid sequence variants may be prepared by methods known in the art by introducing appropriate nucleotide changes into a native or variant polynucleotide. There are two variables in the construction of amino acid sequence variants: the location of the mutation and the nature of the mutation. Nucleic acids encoding the amino acid sequence variants are preferably constructed by mutating the polynucleotide to encode an amino acid sequence that does not occur in nature. These nucleic acid alterations can be made at sites that differ in the



nucleic acids from different species (variable positions) or in highly conserved regions (constant regions). Sites at such locations will typically be modified in series, *e.g.*, by substituting first with conservative choices (*e.g.*, hydrophobic amino acid to a different hydrophobic amino acid) and then with more distant choices (*e.g.*, hydrophobic amino acid to a charged amino acid), and then deletions or insertions may be made at the target site. Amino acid sequence deletions generally range from about 1 to 30 residues, preferably about 1 to 10 residues, and are typically contiguous. Amino acid insertions include amino- and/or carboxyl-terminal fusions ranging in length from one to one hundred or more residues, as well as intrasequence insertions of single or multiple amino acid residues. Intrasequence insertions may range generally from about 1 to 10 amino residues, preferably from 1 to 5 residues. Examples of terminal insertions include the heterologous signal sequences necessary for secretion or for intracellular targeting in different host cells and sequences such as FLAG or poly-histidine sequences useful for purifying the expressed protein.

15           In a preferred method, polynucleotides encoding the novel amino acid sequences are changed via site-directed mutagenesis. This method uses oligonucleotide sequences to alter a polynucleotide to encode the desired amino acid variant, as well as sufficient adjacent nucleotides on both sides of the changed amino acid to form a stable duplex on either side of the site of being changed. In general, the techniques of site-directed

20           mutagenesis are well known to those of skill in the art and this technique is exemplified by publications such as, Edelman et al., *DNA* 2:183 (1983). A versatile and efficient method for producing site-specific changes in a polynucleotide sequence was published by Zoller and Smith, *Nucleic Acids Res.* 10:6487-6500 (1982). PCR may also be used to create amino acid sequence variants of the novel nucleic acids. When small amounts of

25           template DNA are used as starting material, primer(s) that differs slightly in sequence from the corresponding region in the template DNA can generate the desired amino acid variant. PCR amplification results in a population of product DNA fragments that differ from the polynucleotide template encoding the polypeptide at the position specified by the primer. The product DNA fragments replace the corresponding region in the plasmid

30           and this gives a polynucleotide encoding the desired amino acid variant.

A further technique for generating amino acid variants is the cassette mutagenesis technique described in Wells et al., *Gene* 34:315 (1985); and other mutagenesis techniques well known in the art, such as, for example, the techniques in Sambrook et al., supra, and *Current Protocols in Molecular Biology*, Ausubel et al. Due to the inherent  
5 degeneracy of the genetic code, other DNA sequences which encode substantially the same or a functionally equivalent amino acid sequence may be used in the practice of the invention for the cloning and expression of these novel nucleic acids. Such DNA sequences include those which are capable of hybridizing to the appropriate novel nucleic acid sequence under stringent conditions.

10 Polynucleotides encoding preferred polypeptide truncations of the invention can be used to generate polynucleotides encoding chimeric or fusion proteins comprising one or more domains of the invention and heterologous protein sequences.

The polynucleotides of the invention additionally include the complement of any of the polynucleotides recited above. The polynucleotide can be DNA (genomic, cDNA,  
15 amplified, or synthetic) or RNA. Methods and algorithms for obtaining such polynucleotides are well known to those of skill in the art and can include, for example, methods for determining hybridization conditions that can routinely isolate polynucleotides of the desired sequence identities.

In accordance with the invention, polynucleotide sequences comprising the  
20 mature protein coding sequences corresponding to any one of SEQ ID NO:1-739, or functional equivalents thereof, may be used to generate recombinant DNA molecules that direct the expression of that nucleic acid, or a functional equivalent thereof, in appropriate host cells. Also included are the cDNA inserts of any of the clones identified herein.

25 A polynucleotide according to the invention can be joined to any of a variety of other nucleotide sequences by well-established recombinant DNA techniques (see Sambrook J et al. (1989) *Molecular Cloning: A Laboratory Manual*, Cold Spring Harbor Laboratory, NY). Useful nucleotide sequences for joining to polynucleotides include an assortment of vectors, e.g., plasmids, cosmids, lambda phage derivatives, phagemids, and  
30 the like, that are well known in the art. Accordingly, the invention also provides a vector including a polynucleotide of the invention and a host cell containing the polynucleotide.

In general, the vector contains an origin of replication functional in at least one organism, convenient restriction endonuclease sites, and a selectable marker for the host cell.

Vectors according to the invention include expression vectors, replication vectors, probe generation vectors, and sequencing vectors. A host cell according to the invention can be  
5 a prokaryotic or eukaryotic cell and can be a unicellular organism or part of a multicellular organism.

The present invention further provides recombinant constructs comprising a nucleic acid having any of the nucleotide sequences of SEQ ID NO:1-739 or a fragment thereof or any other polynucleotides of the invention. In one embodiment, the  
10 recombinant constructs of the present invention comprise a vector, such as a plasmid or viral vector, into which a nucleic acid having any of the nucleotide sequences of SEQ ID NO:1-739 or a fragment thereof is inserted, in a forward or reverse orientation. In the case of a vector comprising one of the ORFs of the present invention, the vector may further comprise regulatory sequences, including for example, a promoter, operably  
15 linked to the ORF. Large numbers of suitable vectors and promoters are known to those of skill in the art and are commercially available for generating the recombinant constructs of the present invention. The following vectors are provided by way of example. Bacterial: pBs, phagescript, PsiX174, pBluescript SK, pBs KS, pNH8a, pNH16a, pNH18a, pNH46a (Stratagene); pTrc99A, pKK223-3, pKK233-3, pDR540,  
20 pRIT5 (Pharmacia). Eukaryotic: pWLneo, pSV2cat, pOG44, PXTI, pSG (Stratagene) pSVK3, pBPV, pMSG, pSVL (Pharmacia).

The isolated polynucleotide of the invention may be operably linked to an expression control sequence such as the pMT2 or pED expression vectors disclosed in Kaufman et al., *Nucleic Acids Res.* 19, 4485-4490 (1991), in order to produce the protein  
25 recombinantly. Many suitable expression control sequences are known in the art. General methods of expressing recombinant proteins are also known and are exemplified in R. Kaufman, *Methods in Enzymology* 185, 537-566 (1990). As defined herein "operably linked" means that the isolated polynucleotide of the invention and an expression control sequence are situated within a vector or cell in such a way that the  
30 protein is expressed by a host cell which has been transformed (transfected) with the ligated polynucleotide/expression control sequence.

Promoter regions can be selected from any desired gene using CAT (chloramphenicol transferase) vectors or other vectors with selectable markers. Two appropriate vectors are pKK232-8 and pCM7. Particular named bacterial promoters include lacI, lacZ, T3, T7, gpt, lambda PR, and trc. Eukaryotic promoters include CMV immediate early, HSV thymidine kinase, early and late SV40, LTRs from retrovirus, and mouse metallothionein-I. Selection of the appropriate vector and promoter is well within the level of ordinary skill in the art. Generally, recombinant expression vectors will include origins of replication and selectable markers permitting transformation of the host cell, *e.g.*, the ampicillin resistance gene of *E. coli* and *S. cerevisiae* TRP1 gene, and a promoter derived from a highly-expressed gene to direct transcription of a downstream structural sequence. Such promoters can be derived from operons encoding glycolytic enzymes such as 3-phosphoglycerate kinase (PGK), a-factor, acid phosphatase, or heat shock proteins, among others. The heterologous structural sequence is assembled in appropriate phase with translation initiation and termination sequences, and preferably, a leader sequence capable of directing secretion of translated protein into the periplasmic space or extracellular medium. Optionally, the heterologous sequence can encode a fusion protein including an amino terminal identification peptide imparting desired characteristics, *e.g.*, stabilization or simplified purification of expressed recombinant product. Useful expression vectors for bacterial use are constructed by inserting a structural DNA sequence encoding a desired protein together with suitable translation initiation and termination signals in operable reading phase with a functional promoter. The vector will comprise one or more phenotypic selectable markers and an origin of replication to ensure maintenance of the vector and to, if desirable, provide amplification within the host. Suitable prokaryotic hosts for transformation include *E. coli*, *Bacillus subtilis*, *Salmonella typhimurium* and various species within the genera *Pseudomonas*, *Streptomyces*, and *Staphylococcus*, although others may also be employed as a matter of choice.

As a representative but non-limiting example, useful expression vectors for bacterial use can comprise a selectable marker and bacterial origin of replication derived from commercially available plasmids comprising genetic elements of the well known cloning vector pBR322 (ATCC 37017). Such commercial vectors include, for example,

pKK223-3 (Pharmacia Fine Chemicals, Uppsala, Sweden) and GEM 1 (Promega Biotech, Madison, WI, USA). These pBR322 "backbone" sections are combined with an appropriate promoter and the structural sequence to be expressed. Following transformation of a suitable host strain and growth of the host strain to an appropriate cell density, the selected promoter is induced or derepressed by appropriate means (*e.g.*, temperature shift or chemical induction) and cells are cultured for an additional period. Cells are typically harvested by centrifugation, disrupted by physical or chemical means, and the resulting crude extract retained for further purification.

Polynucleotides of the invention can also be used to induce immune responses. For example, as described in Fan et al., *Nat. Biotech.* 17:870-872 (1999), incorporated herein by reference, nucleic acid sequences encoding a polypeptide may be used to generate antibodies against the encoded polypeptide following topical administration of naked plasmid DNA or following injection, and preferably intramuscular injection of the DNA. The nucleic acid sequences are preferably inserted in a recombinant expression vector and may be in the form of naked DNA.

#### 4.3 ANTISENSE

Another aspect of the invention pertains to isolated antisense nucleic acid molecules that are hybridizable to or complementary to the nucleic acid molecule comprising the nucleotide sequence of SEQ ID NO:1-739, or fragments, analogs or derivatives thereof. An "antisense" nucleic acid comprises a nucleotide sequence that is complementary to a "sense" nucleic acid encoding a protein, *e.g.*, complementary to the coding strand of a double-stranded cDNA molecule or complementary to an mRNA sequence. In specific aspects, antisense nucleic acid molecules are provided that comprise a sequence complementary to at least about 10, 25, 50, 100, 250 or 500 nucleotides or an entire coding strand, or to only a portion thereof. Nucleic acid molecules encoding fragments, homologs, derivatives and analogs of a protein of any of SEQ ID NO:740-1478 or antisense nucleic acids complementary to a nucleic acid sequence of SEQ ID NO:1-739 are additionally provided.

In one embodiment, an antisense nucleic acid molecule is antisense to a "coding region" of the coding strand of a nucleotide sequence of the invention. The term "coding

region" refers to the region of the nucleotide sequence comprising codons which are translated into amino acid residues. In another embodiment, the antisense nucleic acid molecule is antisense to a "noncoding region" of the coding strand of a nucleotide sequence of the invention. The term "noncoding region" refers to 5' and 3' sequences which flank the coding region that are not translated into amino acids (*i.e.*, also referred to as 5' and 3' untranslated regions).

Given the coding strand sequences encoding a nucleic acid disclosed herein (*e.g.*, SEQ ID NO:1-739), antisense nucleic acids of the invention can be designed according to the rules of Watson and Crick or Hoogsteen base pairing. The antisense nucleic acid molecule can be complementary to the entire coding region of a mRNA, but more preferably is an oligonucleotide that is antisense to only a portion of the coding or noncoding region of a mRNA. For example, the antisense oligonucleotide can be complementary to the region surrounding the translation start site of a mRNA. An antisense oligonucleotide can be, for example, about 5, 10, 15, 20, 25, 30, 35, 40, 45 or 50 nucleotides in length. An antisense nucleic acid of the invention can be constructed using chemical synthesis or enzymatic ligation reactions using procedures known in the art. For example, an antisense nucleic acid (*e.g.*, an antisense oligonucleotide) can be chemically synthesized using naturally occurring nucleotides or variously modified nucleotides designed to increase the biological stability of the molecules or to increase the physical stability of the duplex formed between the antisense and sense nucleic acids, *e.g.*, phosphorothioate derivatives and acridine substituted nucleotides can be used.

Examples of modified nucleotides that can be used to generate the antisense nucleic acid include: 5-fluorouracil, 5-bromouracil, 5-chlorouracil, 5-iodouracil, hypoxanthine, xanthine, 4-acetylcytosine, 5-(carboxyhydroxymethyl) uracil, 5-carboxymethylaminomethyl-2-thiouridine, 5-carboxymethylaminomethyluracil, dihydrouracil, beta-D-galactosylqueosine, inosine, N6-isopentenyladenine, 1-methylguanine, 1-methylinosine, 2,2-dimethylguanine, 2-methyladenine, 2-methylguanine, 3-methylcytosine, 5-methylcytosine, N6-adenine, 7-methylguanine, 5-methylaminomethyluracil, 5-methoxyaminomethyl-2-thiouracil, beta-D-mannosylqueosine, 5'-methoxycarboxymethyluracil, 5-methoxyuracil, 2-methylthio-N6-isopentenyladenine, uracil-5-oxyacetic acid (*v*), wybutoxosine,

pseudouracil, queosine, 2-thiocytosine, 5-methyl-2-thiouracil, 2-thiouracil, 4-thiouracil, 5-methyluracil, uracil-5-oxyacetic acid methylester, uracil-5-oxyacetic acid (v), 5-methyl-2-thiouracil, 3-(3-amino-3-N-2-carboxypropyl) uracil, (acp3)w, and 2,6-diaminopurine. Alternatively, the antisense nucleic acid can be produced biologically using an expression vector into which a nucleic acid has been subcloned in an antisense orientation (*i.e.*, RNA transcribed from the inserted nucleic acid will be of an antisense orientation to a target nucleic acid of interest, described further in the following subsection).

The antisense nucleic acid molecules of the invention are typically administered to a subject or generated *in situ* such that they hybridize with or bind to cellular mRNA and/or genomic DNA encoding a protein according to the invention to thereby inhibit expression of the protein, *e.g.*, by inhibiting transcription and/or translation. The hybridization can be by conventional nucleotide complementarity to form a stable duplex, or, for example, in the case of an antisense nucleic acid molecule that binds to DNA duplexes, through specific interactions in the major groove of the double helix. An example of a route of administration of antisense nucleic acid molecules of the invention includes direct injection at a tissue site. Alternatively, antisense nucleic acid molecules can be modified to target selected cells and then administered systemically. For example, for systemic administration, antisense molecules can be modified such that they specifically bind to receptors or antigens expressed on a selected cell surface, *e.g.*, by linking the antisense nucleic acid molecules to peptides or antibodies that bind to cell surface receptors or antigens. The antisense nucleic acid molecules can also be delivered to cells using the vectors described herein. To achieve sufficient intracellular concentrations of antisense molecules, vector constructs in which the antisense nucleic acid molecule is placed under the control of a strong pol II or pol III promoter are preferred.

In yet another embodiment, the antisense nucleic acid molecule of the invention is an  $\alpha$ -anomeric nucleic acid molecule. An  $\alpha$ -anomeric nucleic acid molecule forms specific double-stranded hybrids with complementary RNA in which, contrary to the usual  $\beta$ -units, the strands run parallel to each other (Gaultier *et al.* (1987) *Nucleic Acids Res* 15: 6625-6641). The antisense nucleic acid molecule can also comprise a

2'-o-methylribonucleotide (Inoue *et al.* (1987) *Nucleic Acids Res* 15: 6131-6148) or a chimeric RNA-DNA analogue (Inoue *et al.* (1987) *FEBS Lett* 215: 327-330).

#### 4.4 RIBOZYMES AND PNA MOIETIES

5 In still another embodiment, an antisense nucleic acid of the invention is a ribozyme. Ribozymes are catalytic RNA molecules with ribonuclease activity that are capable of cleaving a single-stranded nucleic acid, such as a mRNA, to which they have a complementary region. Thus, ribozymes (*e.g.*, hammerhead ribozymes (described in Haselhoff and Gerlach (1988) *Nature* 334:585-591)) can be used to catalytically cleave a  
10 mRNA transcripts to thereby inhibit translation of a mRNA. A ribozyme having specificity for a nucleic acid of the invention can be designed based upon the nucleotide sequence of a DNA disclosed herein (*i.e.*, SEQ ID NO:1-739). For example, a derivative of a Tetrahymena L-19 IVS RNA can be constructed in which the nucleotide sequence of the active site is complementary to the nucleotide sequence to be cleaved in a  
15 SECX-encoding mRNA. See, *e.g.*, Cech *et al.* U.S. Pat. No. 4,987,071; and Cech *et al.* U.S. Pat. No. 5,116,742. Alternatively, SECX mRNA can be used to select a catalytic RNA having a specific ribonuclease activity from a pool of RNA molecules. See, *e.g.*, Bartel *et al.*, (1993) *Science* 261:1411-1418.

Alternatively, gene expression can be inhibited by targeting nucleotide sequences  
20 complementary to the regulatory region (*e.g.*, promoter and/or enhancers) to form triple helical structures that prevent transcription of the gene in target cells. See generally, Helene. (1991) *Anticancer Drug Des.* 6: 569-84; Helene. *et al.* (1992) *Ann. N.Y. Acad. Sci.* 660:27-36; and Maher (1992) *Bioassays* 14: 807-15.

In various embodiments, the nucleic acids of the invention can be modified at the  
25 base moiety, sugar moiety or phosphate backbone to improve, *e.g.*, the stability, hybridization, or solubility of the molecule. For example, the deoxyribose phosphate backbone of the nucleic acids can be modified to generate peptide nucleic acids (see Hyrup *et al.* (1996) *Bioorg Med Chem* 4: 5-23). As used herein, the terms "peptide nucleic acids" or "PNAs" refer to nucleic acid mimics, *e.g.*, DNA mimics, in which the  
30 deoxyribose phosphate backbone is replaced by a pseudopeptide backbone and only the four natural nucleobases are retained. The neutral backbone of PNAs has been shown to



allow for specific hybridization to DNA and RNA under conditions of low ionic strength. The synthesis of PNA oligomers can be performed using standard solid phase peptide synthesis protocols as described in Hyrup *et al.* (1996) above; Perry-O'Keefe *et al.* (1996) *PNAS* 93: 14670-675.

5           PNAs of the invention can be used in therapeutic and diagnostic applications. For example, PNAs can be used as antisense or antigene agents for sequence-specific modulation of gene expression by, *e.g.*, inducing transcription or translation arrest or inhibiting replication. PNAs of the invention can also be used, *e.g.*, in the analysis of single base pair mutations in a gene by, *e.g.*, PNA directed PCR clamping; as artificial  
10 restriction enzymes when used in combination with other enzymes, *e.g.*, S1 nucleases (Hyrup B. (1996) above); or as probes or primers for DNA sequence and hybridization (Hyrup *et al.* (1996), above; Perry-O'Keefe (1996), above).

          In another embodiment, PNAs of the invention can be modified, *e.g.*, to enhance their stability or cellular uptake, by attaching lipophilic or other helper groups to PNA, by  
15 the formation of PNA-DNA chimeras, or by the use of liposomes or other techniques of drug delivery known in the art. For example, PNA-DNA chimeras can be generated that may combine the advantageous properties of PNA and DNA. Such chimeras allow DNA recognition enzymes, *e.g.*, RNase H and DNA polymerases, to interact with the DNA portion while the PNA portion would provide high binding affinity and specificity.  
20 PNA-DNA chimeras can be linked using linkers of appropriate lengths selected in terms of base stacking, number of bonds between the nucleobases, and orientation (Hyrup (1996) above). The synthesis of PNA-DNA chimeras can be performed as described in Hyrup (1996) above and Finn *et al.* (1996) *Nucl Acids Res* 24: 3357-63. For example, a DNA chain can be synthesized on a solid support using standard phosphoramidite  
25 coupling chemistry, and modified nucleoside analogs, *e.g.*, 5'-(4-methoxytrityl)amino-5'-deoxy-thymidine phosphoramidite, can be used between the PNA and the 5' end of DNA (Mag *et al.* (1989) *Nucl Acid Res* 17: 5973-88). PNA monomers are then coupled in a stepwise manner to produce a chimeric molecule with a 5' PNA segment and a 3' DNA segment (Finn *et al.* (1996) above). Alternatively,  
30 chimeric molecules can be synthesized with a 5' DNA segment and a 3' PNA segment. See, Petersen *et al.* (1975) *Bioorg Med Chem Lett* 5: 1119-11124.

In other embodiments, the oligonucleotide may include other appended groups such as peptides (*e.g.*, for targeting host cell receptors *in vivo*), or agents facilitating transport across the cell membrane (see, *e.g.*, Letsinger *et al.*, 1989, *Proc. Natl. Acad. Sci. U.S.A.* 86:6553-6556; Lemaitre *et al.*, 1987, *Proc. Natl. Acad. Sci.* 84:648-652; PCT Publication No. W088/09810) or the blood-brain barrier (see, *e.g.*, PCT Publication No. W089/10134). In addition, oligonucleotides can be modified with hybridization triggered cleavage agents (See, *e.g.*, Krol *et al.*, 1988, *BioTechniques* 6:958-976) or intercalating agents. (See, *e.g.*, Zon, 1988, *Pharm. Res.* 5: 539-549). To this end, the oligonucleotide may be conjugated to another molecule, *e.g.*, a peptide, a hybridization triggered cross-linking agent, a transport agent, a hybridization-triggered cleavage agent, etc.

#### 4.5 HOSTS

The present invention further provides host cells genetically engineered to contain the polynucleotides of the invention. For example, such host cells may contain nucleic acids of the invention introduced into the host cell using known transformation, transfection or infection methods. The present invention still further provides host cells genetically engineered to express the polynucleotides of the invention, wherein such polynucleotides are in operative association with a regulatory sequence heterologous to the host cell which drives expression of the polynucleotides in the cell.

Knowledge of nucleic acid sequences allows for modification of cells to permit, or increase, expression of endogenous polypeptide. Cells can be modified (*e.g.*, by homologous recombination) to provide increased polypeptide expression by replacing, in whole or in part, the naturally occurring promoter with all or part of a heterologous promoter so that the cells express the polypeptide at higher levels. The heterologous promoter is inserted in such a manner that it is operatively linked to the encoding sequences. See, for example, PCT International Publication No. WO94/12650, PCT International Publication No. WO92/20808, and PCT International Publication No. WO91/09955. It is also contemplated that, in addition to heterologous promoter DNA, amplifiable marker DNA (*e.g.*, *ada*, *dhfr*, and the multifunctional CAD gene which encodes carbamyl phosphate synthase, aspartate transcarbamylase, and dihydroorotase) and/or intron DNA may be inserted along with the heterologous promoter DNA. If

linked to the coding sequence, amplification of the marker DNA by standard selection methods results in co-amplification of the desired protein coding sequences in the cells.

The host cell can be a higher eukaryotic host cell, such as a mammalian cell, a lower eukaryotic host cell, such as a yeast cell, or the host cell can be a prokaryotic cell, such as a bacterial cell. Introduction of the recombinant construct into the host cell can be effected by calcium phosphate transfection, DEAE, dextran mediated transfection, or electroporation (Davis, L. et al., *Basic Methods in Molecular Biology* (1986)). The host cells containing one of the polynucleotides of the invention, can be used in conventional manners to produce the gene product encoded by the isolated fragment (in the case of an ORF) or can be used to produce a heterologous protein under the control of the EMF.

Any host/vector system can be used to express one or more of the ORFs of the present invention. These include, but are not limited to, eukaryotic hosts such as HeLa cells, Cv-1 cell, COS cells, 293 cells, and Sf9 cells, as well as prokaryotic host such as *E. coli* and *B. subtilis*. The most preferred cells are those which do not normally express the particular polypeptide or protein or which expresses the polypeptide or protein at low natural level. Mature proteins can be expressed in mammalian cells, yeast, bacteria, or other cells under the control of appropriate promoters. Cell-free translation systems can also be employed to produce such proteins using RNAs derived from the DNA constructs of the present invention. Appropriate cloning and expression vectors for use with prokaryotic and eukaryotic hosts are described by Sambrook, et al., in *Molecular Cloning: A Laboratory Manual*, Second Edition, Cold Spring Harbor, New York (1989), the disclosure of which is hereby incorporated by reference.

Various mammalian cell culture systems can also be employed to express recombinant protein. Examples of mammalian expression systems include the COS-7 lines of monkey kidney fibroblasts, described by Gluzman, *Cell* 23:175 (1981). Other cell lines capable of expressing a compatible vector are, for example, the C127, monkey COS cells, Chinese Hamster Ovary (CHO) cells, human kidney 293 cells, human epidermal A431 cells, human Colo205 cells, 3T3 cells, CV-1 cells, other transformed primate cell lines, normal diploid cells, cell strains derived from *in vitro* culture of primary tissue, primary explants, HeLa cells, mouse L cells, BHK, HL-60, U937, HaK or Jurkat cells. Mammalian expression vectors will comprise an origin of replication, a

suitable promoter and also any necessary ribosome binding sites, polyadenylation site, splice donor and acceptor sites, transcriptional termination sequences, and 5' flanking nontranscribed sequences. DNA sequences derived from the SV40 viral genome, for example, SV40 origin, early promoter, enhancer, splice, and polyadenylation sites may be used to provide the required nontranscribed genetic elements. Recombinant polypeptides and proteins produced in bacterial culture are usually isolated by initial extraction from cell pellets, followed by one or more salting-out, aqueous ion exchange or size exclusion chromatography steps. Protein refolding steps can be used, as necessary, in completing configuration of the mature protein. Finally, high performance liquid chromatography (HPLC) can be employed for final purification steps. Microbial cells employed in expression of proteins can be disrupted by any convenient method, including freeze-thaw cycling, sonication, mechanical disruption, or use of cell lysing agents.

Alternatively, it may be possible to produce the protein in lower eukaryotes such as yeast or insects or in prokaryotes such as bacteria. Potentially suitable yeast strains include *Saccharomyces cerevisiae*, *Schizosaccharomyces pombe*, *Kluyveromyces* strains, *Candida*, or any yeast strain capable of expressing heterologous proteins. Potentially suitable bacterial strains include *Escherichia coli*, *Bacillus subtilis*, *Salmonella typhimurium*, or any bacterial strain capable of expressing heterologous proteins. If the protein is made in yeast or bacteria, it may be necessary to modify the protein produced therein, for example by phosphorylation or glycosylation of the appropriate sites, in order to obtain the functional protein. Such covalent attachments may be accomplished using known chemical or enzymatic methods.

In another embodiment of the present invention, cells and tissues may be engineered to express an endogenous gene comprising the polynucleotides of the invention under the control of inducible regulatory elements, in which case the regulatory sequences of the endogenous gene may be replaced by homologous recombination. As described herein, gene targeting can be used to replace a gene's existing regulatory region with a regulatory sequence isolated from a different gene or a novel regulatory sequence synthesized by genetic engineering methods. Such regulatory sequences may be comprised of promoters, enhancers, scaffold-attachment regions, negative regulatory elements, transcriptional initiation sites, regulatory protein binding sites or combinations

of said sequences. Alternatively, sequences which affect the structure or stability of the RNA or protein produced may be replaced, removed, added, or otherwise modified by targeting. These sequence include polyadenylation signals, mRNA stability elements, splice sites, leader sequences for enhancing or modifying transport or secretion properties of the protein, or other sequences which alter or improve the function or stability of protein or RNA molecules.

The targeting event may be a simple insertion of the regulatory sequence, placing the gene under the control of the new regulatory sequence, *e.g.*, inserting a new promoter or enhancer or both upstream of a gene. Alternatively, the targeting event may be a simple deletion of a regulatory element, such as the deletion of a tissue-specific negative regulatory element. Alternatively, the targeting event may replace an existing element; for example, a tissue-specific enhancer can be replaced by an enhancer that has broader or different cell-type specificity than the naturally occurring elements. Here, the naturally occurring sequences are deleted and new sequences are added. In all cases, the identification of the targeting event may be facilitated by the use of one or more selectable marker genes that are contiguous with the targeting DNA, allowing for the selection of cells in which the exogenous DNA has integrated into the host cell genome. The identification of the targeting event may also be facilitated by the use of one or more marker genes exhibiting the property of negative selection, such that the negatively selectable marker is linked to the exogenous DNA, but configured such that the negatively selectable marker flanks the targeting sequence, and such that a correct homologous recombination event with sequences in the host cell genome does not result in the stable integration of the negatively selectable marker. Markers useful for this purpose include the Herpes Simplex Virus thymidine kinase (TK) gene or the bacterial xanthine-guanine phosphoribosyl-transferase (gpt) gene.

The gene targeting or gene activation techniques which can be used in accordance with this aspect of the invention are more particularly described in U.S. Patent No. 5,272,071 to Chappel; U.S. Patent No. 5,578,461 to Sherwin et al.; International Application No. PCT/US92/09627 (WO93/09222) by Selden et al.; and International Application No. PCT/US90/06436 (WO91/06667) by Skoultchi et al., each of which is incorporated by reference herein in its entirety.

#### 4.6 POLYPEPTIDES OF THE INVENTION

The isolated polypeptides of the invention include, but are not limited to, a polypeptide comprising: the amino acid sequences set forth as any one of SEQ ID NO:740-1478 or an amino acid sequence encoded by any one of the nucleotide sequences SEQ ID NO:1-739 or the corresponding full length or mature protein. Polypeptides of the invention also include polypeptides preferably with biological or immunological activity that are encoded by: (a) a polynucleotide having any one of the nucleotide sequences set forth in SEQ ID NO:1-739 or (b) polynucleotides encoding any one of the amino acid sequences set forth as SEQ ID NO:740-1478 or (c) polynucleotides that hybridize to the complement of the polynucleotides of either (a) or (b) under stringent hybridization conditions. The invention also provides biologically active or immunologically active variants of any of the amino acid sequences set forth as SEQ ID NO:740-1478 or the corresponding full length or mature protein; and "substantial equivalents" thereof (e.g., with at least about 65%, at least about 70%, at least about 75%, at least about 80%, at least about 85%, at least about 90%, typically at least about 95%, more typically at least about 98%, or most typically at least about 99% amino acid identity) that retain biological activity. Polypeptides encoded by allelic variants may have a similar, increased, or decreased activity compared to polypeptides comprising SEQ ID NO:740-1478.

Fragments of the proteins of the present invention which are capable of exhibiting biological activity are also encompassed by the present invention. Fragments of the protein may be in linear form or they may be cyclized using known methods, for example, as described in H. U. Saragovi, et al., *Bio/Technology* 10, 773-778 (1992) and in R. S. McDowell, et al., *J. Amer. Chem. Soc.* 114, 9245-9253 (1992), both of which are incorporated herein by reference. Such fragments may be fused to carrier molecules such as immunoglobulins for many purposes, including increasing the valency of protein binding sites.

The present invention also provides both full-length and mature forms (for example, without a signal sequence or precursor sequence) of the disclosed proteins. The protein coding sequence is identified in the sequence listing by translation of the

disclosed nucleotide sequences. The mature form of such protein may be obtained by expression of a full-length polynucleotide in a suitable mammalian cell or other host cell. The sequence of the mature form of the protein is also determinable from the amino acid sequence of the full-length form. Where proteins of the present invention are membrane  
5 bound, soluble forms of the proteins are also provided. In such forms, part or all of the regions causing the proteins to be membrane bound are deleted so that the proteins are fully secreted from the cell in which they are expressed.

Protein compositions of the present invention may further comprise an acceptable carrier, such as a hydrophilic, *e.g.*, pharmaceutically acceptable, carrier.

10 The present invention further provides isolated polypeptides encoded by the nucleic acid fragments of the present invention or by degenerate variants of the nucleic acid fragments of the present invention. By "degenerate variant" is intended nucleotide fragments which differ from a nucleic acid fragment of the present invention (*e.g.*, an ORF) by nucleotide sequence but, due to the degeneracy of the genetic code, encode an  
15 identical polypeptide sequence. Preferred nucleic acid fragments of the present invention are the ORFs that encode proteins.

A variety of methodologies known in the art can be utilized to obtain any one of the isolated polypeptides or proteins of the present invention. At the simplest level, the amino acid sequence can be synthesized using commercially available peptide  
20 synthesizers. The synthetically-constructed protein sequences, by virtue of sharing primary, secondary or tertiary structural and/or conformational characteristics with proteins may possess biological properties in common therewith, including protein activity. This technique is particularly useful in producing small peptides and fragments of larger polypeptides. Fragments are useful, for example, in generating antibodies  
25 against the native polypeptide. Thus, they may be employed as biologically active or immunological substitutes for natural, purified proteins in screening of therapeutic compounds and in immunological processes for the development of antibodies.

The polypeptides and proteins of the present invention can alternatively be purified from cells which have been altered to express the desired polypeptide or protein.  
30 As used herein, a cell is said to be altered to express a desired polypeptide or protein when the cell, through genetic manipulation, is made to produce a polypeptide or protein

which it normally does not produce or which the cell normally produces at a lower level. One skilled in the art can readily adapt procedures for introducing and expressing either recombinant or synthetic sequences into eukaryotic or prokaryotic cells in order to generate a cell which produces one of the polypeptides or proteins of the present invention.

The invention also relates to methods for producing a polypeptide comprising growing a culture of host cells of the invention in a suitable culture medium, and purifying the protein from the cells or the culture in which the cells are grown. For example, the methods of the invention include a process for producing a polypeptide in which a host cell containing a suitable expression vector that includes a polynucleotide of the invention is cultured under conditions that allow expression of the encoded polypeptide. The polypeptide can be recovered from the culture, conveniently from the culture medium, or from a lysate prepared from the host cells and further purified. Preferred embodiments include those in which the protein produced by such process is a full length or mature form of the protein.

In an alternative method, the polypeptide or protein is purified from bacterial cells which naturally produce the polypeptide or protein. One skilled in the art can readily follow known methods for isolating polypeptides and proteins in order to obtain one of the isolated polypeptides or proteins of the present invention. These include, but are not limited to, immunochromatography, HPLC, size-exclusion chromatography, ion-exchange chromatography, and immuno-affinity chromatography. See, *e.g.*, Scopes, *Protein Purification: Principles and Practice*, Springer-Verlag (1994); Sambrook, et al., in *Molecular Cloning: A Laboratory Manual*; Ausubel et al., *Current Protocols in Molecular Biology*. Polypeptide fragments that retain biological/immunological activity include fragments comprising greater than about 100 amino acids, or greater than about 200 amino acids, and fragments that encode specific protein domains.

The purified polypeptides can be used in *in vitro* binding assays which are well known in the art to identify molecules which bind to the polypeptides. These molecules include but are not limited to, for *e.g.*, small molecules, molecules from combinatorial libraries, antibodies or other proteins. The molecules identified in the binding assay are then tested for antagonist or agonist activity in *in vivo* tissue culture or animal models



that are well known in the art. In brief, the molecules are titrated into a plurality of cell cultures or animals and then tested for either cell/animal death or prolonged survival of the animal/cells.

In addition, the peptides of the invention or molecules capable of binding to the peptides may be complexed with toxins, e.g., ricin or cholera, or with other compounds that are toxic to cells. The toxin-binding molecule complex is then targeted to a tumor or other cell by the specificity of the binding molecule for SEQ ID NO:740-1478.

The protein of the invention may also be expressed as a product of transgenic animals, e.g., as a component of the milk of transgenic cows, goats, pigs, or sheep which are characterized by somatic or germ cells containing a nucleotide sequence encoding the protein.

The proteins provided herein also include proteins characterized by amino acid sequences similar to those of purified proteins but into which modification are naturally provided or deliberately engineered. For example, modifications, in the peptide or DNA sequence, can be made by those skilled in the art using known techniques. Modifications of interest in the protein sequences may include the alteration, substitution, replacement, insertion or deletion of a selected amino acid residue in the coding sequence. For example, one or more of the cysteine residues may be deleted or replaced with another amino acid to alter the conformation of the molecule. Techniques for such alteration, substitution, replacement, insertion or deletion are well known to those skilled in the art (see, e.g., U.S. Pat. No. 4,518,584). Preferably, such alteration, substitution, replacement, insertion or deletion retains the desired activity of the protein. Regions of the protein that are important for the protein function can be determined by various methods known in the art including the alanine-scanning method which involved systematic substitution of single or strings of amino acids with alanine, followed by testing the resulting alanine-containing variant for biological activity. This type of analysis determines the importance of the substituted amino acid(s) in biological activity. Regions of the protein that are important for protein function may be determined by the eMATRIX program.

Other fragments and derivatives of the sequences of proteins which would be expected to retain protein activity in whole or in part and are useful for screening or other

immunological methodologies may also be easily made by those skilled in the art given the disclosures herein. Such modifications are encompassed by the present invention.

The protein may also be produced by operably linking the isolated polynucleotide of the invention to suitable control sequences in one or more insect expression vectors, and employing an insect expression system. Materials and methods for  
5 baculovirus/insect cell expression systems are commercially available in kit form from, *e.g.*, Invitrogen, San Diego, Calif., U.S.A. (the MaxBat™ kit), and such methods are well known in the art, as described in Summers and Smith, Texas Agricultural Experiment Station Bulletin No. 1555 (1987), incorporated herein by reference. As used herein, an  
10 insect cell capable of expressing a polynucleotide of the present invention is "transformed."

The protein of the invention may be prepared by culturing transformed host cells under culture conditions suitable to express the recombinant protein. The resulting expressed protein may then be purified from such culture (*i.e.*, from culture medium or  
15 cell extracts) using known purification processes, such as gel filtration and ion exchange chromatography. The purification of the protein may also include an affinity column containing agents which will bind to the protein; one or more column steps over such affinity resins as concanavalin A-agarose, heparin-toyopearl™ or Cibacrom blue 3GA Sepharose™; one or more steps involving hydrophobic interaction chromatography using  
20 such resins as phenyl ether, butyl ether, or propyl ether; or immunoaffinity chromatography.

Alternatively, the protein of the invention may also be expressed in a form which will facilitate purification. For example, it may be expressed as a fusion protein, such as those of maltose binding protein (MBP), glutathione-S-transferase (GST) or thioredoxin  
25 (TRX), or as a His tag. Kits for expression and purification of such fusion proteins are commercially available from New England BioLab (Beverly, Mass.), Pharmacia (Piscataway, N.J.) and Invitrogen, respectively. The protein can also be tagged with an epitope and subsequently purified by using a specific antibody directed to such epitope. One such epitope ("FLAG®") is commercially available from Kodak (New Haven,  
30 Conn.).

Finally, one or more reverse-phase high performance liquid chromatography (RP-HPLC) steps employing hydrophobic RP-HPLC media, *e.g.*, silica gel having pendant methyl or other aliphatic groups, can be employed to further purify the protein. Some or all of the foregoing purification steps, in various combinations, can also be employed to provide a substantially homogeneous isolated recombinant protein. The protein thus purified is substantially free of other mammalian proteins and is defined in accordance with the present invention as an "isolated protein."

The polypeptides of the invention include analogs (variants). This embraces fragments, as well as peptides in which one or more amino acids has been deleted, inserted, or substituted. Also, analogs of the polypeptides of the invention embrace fusions of the polypeptides or modifications of the polypeptides of the invention, wherein the polypeptide or analog is fused to another moiety or moieties, *e.g.*, targeting moiety or another therapeutic agent. Such analogs may exhibit improved properties such as activity and/or stability. Examples of moieties which may be fused to the polypeptide or an analog include, for example, targeting moieties which provide for the delivery of polypeptide to pancreatic cells, *e.g.*, antibodies to pancreatic cells, antibodies to immune cells such as T-cells, monocytes, dendritic cells, granulocytes, etc., as well as receptor and ligands expressed on pancreatic or immune cells. Other moieties which may be fused to the polypeptide include therapeutic agents which are used for treatment, for example, immunosuppressive drugs such as cyclosporin, SK506, azathioprine, CD3 antibodies and steroids. Also, polypeptides may be fused to immune modulators, and other cytokines such as alpha or beta interferon.

#### **4.6.1 DETERMINING POLYPEPTIDE AND POLYNUCLEOTIDE IDENTITY AND SIMILARITY**

Preferred identity and/or similarity are designed to give the largest match between the sequences tested. Methods to determine identity and similarity are codified in computer programs including, but are not limited to, the GCG program package, including GAP (Devereux, J., et al., *Nucleic Acids Research* 12(1):387 (1984); Genetics Computer Group, University of Wisconsin, Madison, WI), BLASTP, BLASTN, BLASTX, FASTA (Altschul, S.F. et al., *J. Molec. Biol.* 215:403-410 (1990), PSI-BLAST

(Altschul S.F. et al., Nucleic Acids Res. vol. 25, pp. 3389-3402, herein incorporated by reference), eMatrix software (Wu et al., J. Comp. Biol., Vol. 6, pp. 219-235 (1999), herein incorporated by reference), eMotif software (Nevill-Manning et al, ISMB-97, Vol. 4, pp. 202-209, herein incorporated by reference), pFam software (Sonnhammer et al.,  
5 Nucleic Acids Res., Vol. 26(1), pp. 320-322 (1998), herein incorporated by reference) and the Kyte-Doolittle hydrophobicity prediction algorithm (J. Mol Biol, 157, pp. 105-31 (1982), incorporated herein by reference). The BLAST programs are publicly available from the National Center for Biotechnology Information (NCBI) and other sources (BLAST Manual, Altschul, S., et al. NCB NLM NIH Bethesda, MD 20894; Altschul, S.,  
10 et al., J. Mol. Biol. 215:403-410 (1990).

#### 4.7 CHIMERIC AND FUSION PROTEINS

The invention also provides chimeric or fusion proteins. As used herein, a "chimeric protein" or "fusion protein" comprises a polypeptide of the invention operatively linked to another polypeptide. Within a fusion protein the polypeptide  
15 according to the invention can correspond to all or a portion of a protein according to the invention. In one embodiment, a fusion protein comprises at least one biologically active portion of a protein according to the invention. In another embodiment, a fusion protein comprises at least two biologically active portions of a protein according to the invention. Within the fusion protein, the term "operatively linked" is intended to indicate  
20 that the polypeptide according to the invention and the other polypeptide are fused in-frame to each other. The polypeptide can be fused to the N-terminus or C-terminus.

For example, in one embodiment a fusion protein comprises a polypeptide according to the invention operably linked to the extracellular domain of a second protein.

25 In another embodiment, the fusion protein is a GST-fusion protein in which the polypeptide sequences of the invention are fused to the C-terminus of the GST (i.e., glutathione S-transferase) sequences.

In another embodiment, the fusion protein is an immunoglobulin fusion protein in which the polypeptide sequences according to the invention comprises one or more  
30 domains are fused to sequences derived from a member of the immunoglobulin protein family. The immunoglobulin fusion proteins of the invention can be incorporated into

pharmaceutical compositions and administered to a subject to inhibit an interaction between a ligand and a protein of the invention on the surface of a cell, to thereby suppress signal transduction *in vivo*. The immunoglobulin fusion proteins can be used to affect the bioavailability of a cognate ligand. Inhibition of the ligand/protein interaction may be useful therapeutically for both the treatment of proliferative and differentiative disorders, *e.g.*, cancer as well as modulating (*e.g.*, promoting or inhibiting) cell survival. Moreover, the immunoglobulin fusion proteins of the invention can be used as immunogens to produce antibodies in a subject, to purify ligands, and in screening assays to identify molecules that inhibit the interaction of a polypeptide of the invention with a ligand.

A chimeric or fusion protein of the invention can be produced by standard recombinant DNA techniques. For example, DNA fragments coding for the different polypeptide sequences are ligated together in-frame in accordance with conventional techniques, *e.g.*, by employing blunt-ended or stagger-ended termini for ligation, restriction enzyme digestion to provide for appropriate termini, filling-in of cohesive ends as appropriate, alkaline phosphatase treatment to avoid undesirable joining, and enzymatic ligation. In another embodiment, the fusion gene can be synthesized by conventional techniques including automated DNA synthesizers. Alternatively, PCR amplification of gene fragments can be carried out using anchor primers that give rise to complementary overhangs between two consecutive gene fragments that can subsequently be annealed and reamplified to generate a chimeric gene sequence (see, for example, Ausubel et al. (eds.) CURRENT PROTOCOLS IN MOLECULAR BIOLOGY, John Wiley & Sons, 1992). Moreover, many expression vectors are commercially available that already encode a fusion moiety (*e.g.*, a GST polypeptide). A nucleic acid encoding a polypeptide of the invention can be cloned into such an expression vector such that the fusion moiety is linked in-frame to the protein of the invention.

#### 4.8 GENE THERAPY

Mutations in the polynucleotides of the invention gene may result in loss of normal function of the encoded protein. The invention thus provides gene therapy to restore normal activity of the polypeptides of the invention; or to treat disease states

involving polypeptides of the invention. Delivery of a functional gene encoding polypeptides of the invention to appropriate cells is effected *ex vivo*, *in situ*, or *in vivo* by use of vectors, and more particularly viral vectors (e.g., adenovirus, adeno-associated virus, or a retrovirus), or *ex vivo* by use of physical DNA transfer methods (e.g.,  
5 liposomes or chemical treatments). See, for example, Anderson, Nature, supplement to vol. 392, no. 6679, pp.25-20 (1998). For additional reviews of gene therapy technology see Friedmann, Science, 244: 1275-1281 (1989); Verma, Scientific American: 68-84 (1990); and Miller, Nature, 357: 455-460 (1992). Introduction of any one of the nucleotides of the present invention or a gene encoding the polypeptides of the present  
10 invention can also be accomplished with extrachromosomal substrates (transient expression) or artificial chromosomes (stable expression). Cells may also be cultured *ex vivo* in the presence of proteins of the present invention in order to proliferate or to produce a desired effect on or activity in such cells. Treated cells can then be introduced *in vivo* for therapeutic purposes. Alternatively, it is contemplated that in other human  
15 disease states, preventing the expression of or inhibiting the activity of polypeptides of the invention will be useful in treating the disease states. It is contemplated that antisense therapy or gene therapy could be applied to negatively regulate the expression of polypeptides of the invention.

Other methods inhibiting expression of a protein include the introduction of  
20 antisense molecules to the nucleic acids of the present invention, their complements, or their translated RNA sequences, by methods known in the art. Further, the polypeptides of the present invention can be inhibited by using targeted deletion methods, or the insertion of a negative regulatory element such as a silencer, which is tissue specific.

The present invention still further provides cells genetically engineered *in vivo* to  
25 express the polynucleotides of the invention, wherein such polynucleotides are in operative association with a regulatory sequence heterologous to the host cell which drives expression of the polynucleotides in the cell. These methods can be used to increase or decrease the expression of the polynucleotides of the present invention.

Knowledge of DNA sequences provided by the invention allows for modification of  
30 cells to permit, increase, or decrease, expression of endogenous polypeptide. Cells can be modified (e.g., by homologous recombination) to provide increased polypeptide expression

by replacing, in whole or in part, the naturally occurring promoter with all or part of a heterologous promoter so that the cells express the protein at higher levels. The heterologous promoter is inserted in such a manner that it is operatively linked to the desired protein encoding sequences. See, for example, PCT International Publication No. WO 94/12650, PCT International Publication No. WO 92/20808, and PCT International Publication No. WO 91/09955. It is also contemplated that, in addition to heterologous promoter DNA, amplifiable marker DNA (e.g., *ada*, *dhfr*, and the multifunctional CAD gene which encodes carbamyl phosphate synthase, aspartate transcarbamylase, and dihydroorotase) and/or intron DNA may be inserted along with the heterologous promoter DNA. If linked to the desired protein coding sequence, amplification of the marker DNA by standard selection methods results in co-amplification of the desired protein coding sequences in the cells.

In another embodiment of the present invention, cells and tissues may be engineered to express an endogenous gene comprising the polynucleotides of the invention under the control of inducible regulatory elements, in which case the regulatory sequences of the endogenous gene may be replaced by homologous recombination. As described herein, gene targeting can be used to replace a gene's existing regulatory region with a regulatory sequence isolated from a different gene or a novel regulatory sequence synthesized by genetic engineering methods. Such regulatory sequences may be comprised of promoters, enhancers, scaffold-attachment regions, negative regulatory elements, transcriptional initiation sites, regulatory protein binding sites or combinations of said sequences. Alternatively, sequences which affect the structure or stability of the RNA or protein produced may be replaced, removed, added, or otherwise modified by targeting. These sequences include polyadenylation signals, mRNA stability elements, splice sites, leader sequences for enhancing or modifying transport or secretion properties of the protein, or other sequences which alter or improve the function or stability of protein or RNA molecules.

The targeting event may be a simple insertion of the regulatory sequence, placing the gene under the control of the new regulatory sequence, *e.g.*, inserting a new promoter or enhancer or both upstream of a gene. Alternatively, the targeting event may be a simple deletion of a regulatory element, such as the deletion of a tissue-specific negative regulatory element. Alternatively, the targeting event may replace an existing element; for example, a

tissue-specific enhancer can be replaced by an enhancer that has broader or different cell-type specificity than the naturally occurring elements. Here, the naturally occurring sequences are deleted and new sequences are added. In all cases, the identification of the targeting event may be facilitated by the use of one or more selectable marker genes that are contiguous with the targeting DNA, allowing for the selection of cells in which the exogenous DNA has integrated into the cell genome. The identification of the targeting event may also be facilitated by the use of one or more marker genes exhibiting the property of negative selection, such that the negatively selectable marker is linked to the exogenous DNA, but configured such that the negatively selectable marker flanks the targeting sequence, and such that a correct homologous recombination event with sequences in the host cell genome does not result in the stable integration of the negatively selectable marker. Markers useful for this purpose include the Herpes Simplex Virus thymidine kinase (TK) gene or the bacterial xanthine-guanine phosphoribosyl-transferase (gpt) gene.

The gene targeting or gene activation techniques which can be used in accordance with this aspect of the invention are more particularly described in U.S. Patent No. 5,272,071 to Chappel; U.S. Patent No. 5,578,461 to Sherwin et al.; International Application No. PCT/US92/09627 (WO93/09222) by Selden et al.; and International Application No. PCT/US90/06436 (WO91/06667) by Skoultchi et al., each of which is incorporated by reference herein in its entirety.

#### 4.9 TRANSGENIC ANIMALS

In preferred methods to determine biological functions of the polypeptides of the invention in vivo, one or more genes provided by the invention are either over expressed or inactivated in the germ line of animals using homologous recombination [Capecchi, Science 244:1288-1292 (1989)]. Animals in which the gene is over expressed, under the regulatory control of exogenous or endogenous promoter elements, are known as transgenic animals. Animals in which an endogenous gene has been inactivated by homologous recombination are referred to as "knockout" animals. Knockout animals, preferably non-human mammals, can be prepared as described in U.S. Patent No. 5,557,032, incorporated herein by reference. Transgenic animals are useful to determine the roles polypeptides of the invention play in biological processes, and preferably in



disease states. Transgenic animals are useful as model systems to identify compounds that modulate lipid metabolism. Transgenic animals, preferably non-human mammals, are produced using methods as described in U.S. Patent No 5,489,743 and PCT Publication No. WO94/28122, incorporated herein by reference.

5 Transgenic animals can be prepared wherein all or part of a promoter of the polynucleotides of the invention is either activated or inactivated to alter the level of expression of the polypeptides of the invention. Inactivation can be carried out using homologous recombination methods described above. Activation can be achieved by supplementing or even replacing the homologous promoter to provide for increased  
10 protein expression. The homologous promoter can be supplemented by insertion of one or more heterologous enhancer elements known to confer promoter activation in a particular tissue.

The polynucleotides of the present invention also make possible the development, through, e.g., homologous recombination or knock out strategies, of animals that fail to  
15 express polypeptides of the invention or that express a variant polypeptide. Such animals are useful as models for studying the *in vivo* activities of polypeptide as well as for studying modulators of the polypeptides of the invention.

In preferred methods to determine biological functions of the polypeptides of the invention *in vivo*, one or more genes provided by the invention are either over expressed  
20 or inactivated in the germ line of animals using homologous recombination [Capecchi, Science 244:1288-1292 (1989)]. Animals in which the gene is over expressed, under the regulatory control of exogenous or endogenous promoter elements, are known as transgenic animals. Animals in which an endogenous gene has been inactivated by homologous recombination are referred to as "knockout" animals. Knockout animals,  
25 preferably non-human mammals, can be prepared as described in U.S. Patent No. 5,557,032, incorporated herein by reference. Transgenic animals are useful to determine the roles polypeptides of the invention play in biological processes, and preferably in disease states. Transgenic animals are useful as model systems to identify compounds that modulate lipid metabolism. Transgenic animals, preferably non-human mammals,  
30 are produced using methods as described in U.S. Patent No 5,489,743 and PCT Publication No. WO94/28122, incorporated herein by reference.

Transgenic animals can be prepared wherein all or part of the polynucleotides of the invention promoter is either activated or inactivated to alter the level of expression of the polypeptides of the invention. Inactivation can be carried out using homologous recombination methods described above. Activation can be achieved by supplementing or even replacing the homologous promoter to provide for increased protein expression. The homologous promoter can be supplemented by insertion of one or more heterologous enhancer elements known to confer promoter activation in a particular tissue.

#### 4.10 USES AND BIOLOGICAL ACTIVITY

The polynucleotides and proteins of the present invention are expected to exhibit one or more of the uses or biological activities (including those associated with assays cited herein) identified herein. Uses or activities described for proteins of the present invention may be provided by administration or use of such proteins or of polynucleotides encoding such proteins (such as, for example, in gene therapies or vectors suitable for introduction of DNA). The mechanism underlying the particular condition or pathology will dictate whether the polypeptides of the invention, the polynucleotides of the invention or modulators (activators or inhibitors) thereof would be beneficial to the subject in need of treatment. Thus, "therapeutic compositions of the invention" include compositions comprising isolated polynucleotides (including recombinant DNA molecules, cloned genes and degenerate variants thereof) or polypeptides of the invention (including full length protein, mature protein and truncations or domains thereof), or compounds and other substances that modulate the overall activity of the target gene products, either at the level of target gene/protein expression or target protein activity. Such modulators include polypeptides, analogs, (variants), including fragments and fusion proteins, antibodies and other binding proteins; chemical compounds that directly or indirectly activate or inhibit the polypeptides of the invention (identified, e.g., via drug screening assays as described herein); antisense polynucleotides and polynucleotides suitable for triple helix formation; and in particular antibodies or other binding partners that specifically recognize one or more epitopes of the polypeptides of the invention.

The polypeptides of the present invention may likewise be involved in cellular activation or in one of the other physiological pathways described herein.

#### 4.10.1 RESEARCH USES AND UTILITIES

5       The polynucleotides provided by the present invention can be used by the research community for various purposes. The polynucleotides can be used to express recombinant protein for analysis, characterization or therapeutic use; as markers for tissues in which the corresponding protein is preferentially expressed (either constitutively or at a particular stage of tissue differentiation or development or in disease states); as molecular weight markers on gels; as chromosome markers or tags (when  
10       labeled) to identify chromosomes or to map related gene positions; to compare with endogenous DNA sequences in patients to identify potential genetic disorders; as probes to hybridize and thus discover novel, related DNA sequences; as a source of information to derive PCR primers for genetic fingerprinting; as a probe to "subtract-out" known  
15       sequences in the process of discovering other novel polynucleotides; for selecting and making oligomers for attachment to a "gene chip" or other support, including for examination of expression patterns; to raise anti-protein antibodies using DNA immunization techniques; and as an antigen to raise anti-DNA antibodies or elicit another immune response. Where the polynucleotide encodes a protein which binds or  
20       potentially binds to another protein (such as, for example, in a receptor-ligand interaction), the polynucleotide can also be used in interaction trap assays (such as, for example, that described in Gyuris et al., Cell 75:791-803 (1993)) to identify polynucleotides encoding the other protein with which binding occurs or to identify inhibitors of the binding interaction.

25       The polypeptides provided by the present invention can similarly be used in assays to determine biological activity, including in a panel of multiple proteins for high-throughput screening; to raise antibodies or to elicit another immune response; as a reagent (including the labeled reagent) in assays designed to quantitatively determine levels of the protein (or its receptor) in biological fluids; as markers for tissues in which  
30       the corresponding polypeptide is preferentially expressed (either constitutively or at a particular stage of tissue differentiation or development or in a disease state); and, of

course, to isolate correlative receptors or ligands. Proteins involved in these binding interactions can also be used to screen for peptide or small molecule inhibitors or ago. of the binding interaction.

Any or all of these research utilities are capable of being developed into reager  
5 grade or kit format for commercialization as research products.

Methods for performing the uses listed above are well known to those skilled in the art. References disclosing such methods include without limitation "Molecular Cloning: A Laboratory Manual", 2d ed., Cold Spring Harbor Laboratory Press, Sambrook, J., E. F. Fritsch and T. Maniatis eds., 1989, and "Methods in Enzymology:  
10 Guide to Molecular Cloning Techniques", Academic Press, Berger, S. L. and A. R. Kimmel eds., 1987.

#### 4.10.2 NUTRITIONAL USES

Polynucleotides and polypeptides of the present invention can also be used as  
15 nutritional sources or supplements. Such uses include without limitation use as a protein or amino acid supplement, use as a carbon source, use as a nitrogen source and use as a source of carbohydrate. In such cases the polypeptide or polynucleotide of the invention can be added to the feed of a particular organism or can be administered as a separate solid or liquid preparation, such as in the form of powder, pills, solutions, suspensions or capsules. In the  
20 case of microorganisms, the polypeptide or polynucleotide of the invention can be added to the medium in or on which the microorganism is cultured.

#### 4.10.3 CYTOKINE AND CELL PROLIFERATION/DIFFERENTIATION ACTIVITY

25 A polypeptide of the present invention may exhibit activity relating to cytokine, cell proliferation (either inducing or inhibiting) or cell differentiation (either inducing or inhibiting) activity or may induce production of other cytokines in certain cell populations. A polynucleotide of the invention can encode a polypeptide exhibiting such attributes. Many protein factors discovered to date, including all known cytokines, have  
30 exhibited activity in one or more factor-dependent cell proliferation assays, and hence the assays serve as a convenient confirmation of cytokine activity. The activity of therapeutic

compositions of the present invention is evidenced by any one of a number of routine factor dependent cell proliferation assays for cell lines including, without limitation, 32D, DA2, DA1G, T10, B9, B9/11, BaF3, MC9/G, M+(preB M+), 2E8, RB5, DA1, 123, T1165, HT2, CTLL2, TF-1, Mo7e, CMK, HUVEC, and Caco. Therapeutic compositions  
5 of the invention can be used in the following:

Assays for T-cell or thymocyte proliferation include without limitation those described in: Current Protocols in Immunology, Ed by J. E. Coligan, A. M. Kruisbeek, D. H. Margulies, E. M. Shevach, W. Strober, Pub. Greene Publishing Associates and Wiley-Interscience (Chapter 3, *In Vitro* assays for Mouse Lymphocyte Function 3.1-3.19;  
10 Chapter 7, Immunologic studies in Humans); Takai et al., J. Immunol. 137:3494-3500, 1986; Bertagnolli et al., J. Immunol. 145:1706-1712, 1990; Bertagnolli et al., Cellular Immunology 133:327-341, 1991; Bertagnolli, et al., I. Immunol. 149:3778-3783, 1992; Bowman et al., I. Immunol. 152:1756-1761, 1994.

Assays for cytokine production and/or proliferation of spleen cells, lymph node  
15 cells or thymocytes include, without limitation, those described in: Polyclonal T cell stimulation, Kruisbeek, A. M. and Shevach, E. M. In Current Protocols in Immunology. J. E. e.a. Coligan eds. Vol 1 pp. 3.12.1-3.12.14, John Wiley and Sons, Toronto. 1994; and Measurement of mouse and human interleukin- $\gamma$ , Schreiber, R. D. In Current Protocols in Immunology. J. E. e.a. Coligan eds. Vol 1 pp. 6.8.1-6.8.8, John Wiley and Sons, Toronto.  
20 1994.

Assays for proliferation and differentiation of hematopoietic and lymphopoietic cells include, without limitation, those described in: Measurement of Human and Murine Interleukin 2 and Interleukin 4, Bottomly, K., Davis, L. S. and Lipsky, P. E. In Current Protocols in Immunology. J. E. e.a. Coligan eds. Vol 1 pp. 6.3.1-6.3.12, John Wiley and  
25 Sons, Toronto. 1991; deVries et al., J. Exp. Med. 173:1205-1211, 1991; Moreau et al., Nature 336:690-692, 1988; Greenberger et al., Proc. Natl. Acad. Sci. U.S.A. 80:2931-2938, 1983; Measurement of mouse and human interleukin 6--Nordan, R. In Current Protocols in Immunology. J. E. Coligan eds. Vol 1 pp. 6.6.1-6.6.5, John Wiley and Sons, Toronto. 1991; Smith et al., Proc. Natl. Aced. Sci. U.S.A. 83:1857-1861, 1986;  
30 Measurement of human Interleukin 11--Bennett, F., Giannotti, J., Clark, S. C. and Turner, K. J. In Current Protocols in Immunology. J. E. Coligan eds. Vol 1 pp. 6.15.1 John

Wiley and Sons, Toronto. 1991; Measurement of mouse and human Interleukin 9--Ciarletta, A., Giannotti, J., Clark, S. C. and Turner, K. J. In Current Protocols in Immunology. J. E. Coligan eds. Vol 1 pp. 6.13.1, John Wiley and Sons, Toronto. 1991.

Assays for T-cell clone responses to antigens (which will identify, among others, proteins that affect APC-T cell interactions as well as direct T-cell effects by measuring proliferation and cytokine production) include, without limitation, those described in: Current Protocols in Immunology, Ed by J. E. Coligan, A. M. Kruisbeek, D. H. Margulies, E. M. Shevach, W Strober, Pub. Greene Publishing Associates and Wiley-Interscience (Chapter 3, *In Vitro* assays for Mouse Lymphocyte Function; Chapter 6, Cytokines and their cellular receptors; Chapter 7, Immunologic studies in Humans); Weinberger et al., Proc. Natl. Acad. Sci. USA 77:6091-6095, 1980; Weinberger et al., Eur. J. Immun. 11:405-411, 1981; Takai et al., J. Immunol. 137:3494-3500, 1986; Takai et al., J. Immunol. 140:508-512, 1988.

#### 15           **4.10.4 STEM CELL GROWTH FACTOR ACTIVITY**

A polypeptide of the present invention may exhibit stem cell growth factor activity and be involved in the proliferation, differentiation and survival of pluripotent and totipotent stem cells including primordial germ cells, embryonic stem cells, hematopoietic stem cells and/or germ line stem cells. Administration of the polypeptide of the invention to stem cells *in vivo* or *ex vivo* is expected to maintain and expand cell populations in a totipotent or pluripotent state which would be useful for re-engineering damaged or diseased tissues, transplantation, manufacture of bio-pharmaceuticals and the development of bio-sensors. The ability to produce large quantities of human cells has important working applications for the production of human proteins which currently must be obtained from non-human sources or donors, implantation of cells to treat diseases such as Parkinson's, Alzheimer's and other neurodegenerative diseases; tissues for grafting such as bone marrow, skin, cartilage, tendons, bone, muscle (including cardiac muscle), blood vessels, cornea, neural cells, gastrointestinal cells and others; and organs for transplantation such as kidney, liver, pancreas (including islet cells), heart and lung.

It is contemplated that multiple different exogenous growth factors and/or cytokines may be administered in combination with the polypeptide of the invention to achieve the desired effect, including any of the growth factors listed herein, other stem cell maintenance factors, and specifically including stem cell factor (SCF), leukemia  
5 inhibitory factor (LIF), Flt-3 ligand (Flt-3L), any of the interleukins, recombinant soluble IL-6 receptor fused to IL-6, macrophage inflammatory protein 1-alpha (MIP-1-alpha), G-CSF, GM-CSF, thrombopoietin (TPO), platelet factor 4 (PF-4), platelet-derived growth factor (PDGF), neural growth factors and basic fibroblast growth factor (bFGF).

Since totipotent stem cells can give rise to virtually any mature cell type,  
10 expansion of these cells in culture will facilitate the production of large quantities of mature cells. Techniques for culturing stem cells are known in the art and administration of polypeptides of the invention, optionally with other growth factors and/or cytokines, is expected to enhance the survival and proliferation of the stem cell populations. This can be accomplished by direct administration of the polypeptide of the invention to the  
15 culture medium. Alternatively, stroma cells transfected with a polynucleotide that encodes for the polypeptide of the invention can be used as a feeder layer for the stem cell populations in culture or in vivo. Stromal support cells for feeder layers may include embryonic bone marrow fibroblasts, bone marrow stromal cells, fetal liver cells, or cultured embryonic fibroblasts (see U.S. Patent No. 5,690,926).

20 Stem cells themselves can be transfected with a polynucleotide of the invention to induce autocrine expression of the polypeptide of the invention. This will allow for generation of undifferentiated totipotent/pluripotent stem cell lines that are useful as is or that can then be differentiated into the desired mature cell types. These stable cell lines can also serve as a source of undifferentiated totipotent/pluripotent mRNA to  
25 create cDNA libraries and templates for polymerase chain reaction experiments. These studies would allow for the isolation and identification of differentially expressed genes in stem cell populations that regulate stem cell proliferation and/or maintenance.

Expansion and maintenance of totipotent stem cell populations will be useful in the treatment of many pathological conditions. For example, polypeptides of the present  
30 invention may be used to manipulate stem cells in culture to give rise to neuroepithelial cells that can be used to augment or replace cells damaged by illness, autoimmune

disease, accidental damage or genetic disorders. The polypeptide of the invention may be useful for inducing the proliferation of neural cells and for the regeneration of nerve and brain tissue, i.e. for the treatment of central and peripheral nervous system diseases and neuropathies, as well as mechanical and traumatic disorders which involve degeneration, death or trauma to neural cells or nerve tissue. In addition, the expanded stem cell populations can also be genetically altered for gene therapy purposes and to decrease host rejection of replacement tissues after grafting or implantation.

Expression of the polypeptide of the invention and its effect on stem cells can also be manipulated to achieve controlled differentiation of the stem cells into more differentiated cell types. A broadly applicable method of obtaining pure populations of a specific differentiated cell type from undifferentiated stem cell populations involves the use of a cell-type specific promoter driving a selectable marker. The selectable marker allows only cells of the desired type to survive. For example, stem cells can be induced to differentiate into cardiomyocytes (Wobus et al., *Differentiation*, 48: 173-182, (1991); Klug et al., *J. Clin. Invest.*, 98(1): 216-224, (1998)) or skeletal muscle cells (Browder, L. W. In: *Principles of Tissue Engineering* eds. Lanza et al., Academic Press (1997)). Alternatively, directed differentiation of stem cells can be accomplished by culturing the stem cells in the presence of a differentiation factor such as retinoic acid and an antagonist of the polypeptide of the invention which would inhibit the effects of endogenous stem cell factor activity and allow differentiation to proceed.

*In vitro* cultures of stem cells can be used to determine if the polypeptide of the invention exhibits stem cell growth factor activity. Stem cells are isolated from any one of various cell sources (including hematopoietic stem cells and embryonic stem cells) and cultured on a feeder layer, as described by Thompson et al. *Proc. Natl. Acad. Sci. U.S.A.*, 92: 7844-7848 (1995), in the presence of the polypeptide of the invention alone or in combination with other growth factors or cytokines. The ability of the polypeptide of the invention to induce stem cells proliferation is determined by colony formation on semi-solid support e.g. as described by Bernstein et al., *Blood*, 77: 2316-2321 (1991).

#### 4.10.5 HEMATOPOIESIS REGULATING ACTIVITY



A polypeptide of the present invention may be involved in regulation of hematopoiesis and, consequently, in the treatment of myeloid or lymphoid cell disorders. Even marginal biological activity in support of colony forming cells or of factor-dependent cell lines indicates involvement in regulating hematopoiesis, e.g. in supporting the growth and proliferation of erythroid progenitor cells alone or in combination with other cytokines, thereby indicating utility, for example, in treating various anemias or for use in conjunction with irradiation/chemotherapy to stimulate the production of erythroid precursors and/or erythroid cells; in supporting the growth and proliferation of myeloid cells such as granulocytes and monocytes/macrophages (i.e., traditional CSF activity) useful, for example, in conjunction with chemotherapy to prevent or treat consequent myelo-suppression; in supporting the growth and proliferation of megakaryocytes and consequently of platelets thereby allowing prevention or treatment of various platelet disorders such as thrombocytopenia, and generally for use in place of or complimentary to platelet transfusions; and/or in supporting the growth and proliferation of hematopoietic stem cells which are capable of maturing to any and all of the above-mentioned hematopoietic cells and therefore find therapeutic utility in various stem cell disorders (such as those usually treated with transplantation, including, without limitation, aplastic anemia and paroxysmal nocturnal hemoglobinuria), as well as in repopulating the stem cell compartment post irradiation/chemotherapy, either *in-vivo* or *ex-vivo* (i.e., in conjunction with bone marrow transplantation or with peripheral progenitor cell transplantation (homologous or heterologous)) as normal cells or genetically manipulated for gene therapy.

Therapeutic compositions of the invention can be used in the following:

Suitable assays for proliferation and differentiation of various hematopoietic lines are cited above.

Assays for embryonic stem cell differentiation (which will identify, among others, proteins that influence embryonic differentiation hematopoiesis) include, without limitation, those described in: Johansson et al. Cellular Biology 15:141-151, 1995; Keller et al., Molecular and Cellular Biology 13:473-486, 1993; McClanahan et al., Blood 81:2903-2915, 1993.

- Assays for stem cell survival and differentiation (which will identify, among others, proteins that regulate lympho-hematopoiesis) include, without limitation, those described in: Methylcellulose colony forming assays, Freshney, M. G. In Culture of Hematopoietic Cells. R. I. Freshney, et al. eds. Vol pp. 265-268, Wiley-Liss, Inc., New York, N.Y. 1994; Hirayama et al., Proc. Natl. Acad. Sci. USA 89:5907-5911, 1992;
- 5 Primitive hematopoietic colony forming cells with high proliferative potential, McNiece, I. K. and Briddell, R. A. In Culture of Hematopoietic Cells. R. I. Freshney, et al. eds. Vol pp. 23-39, Wiley-Liss, Inc., New York, N.Y. 1994; Neben et al., Experimental Hematology 22:353-359, 1994; Cobblestone area forming cell assay, Ploemacher, R. E.
- 10 In Culture of Hematopoietic Cells. R. I. Freshney, et al. eds. Vol pp. 1-21, Wiley-Liss, Inc., New York, N.Y. 1994; Long term bone marrow cultures in the presence of stromal cells, Spooncer, E., Dexter, M. and Allen, T. In Culture of Hematopoietic Cells. R. I. Freshney, et al. eds. Vol pp. 163-179, Wiley-Liss, Inc., New York, N.Y. 1994; Long term culture initiating cell assay, Sutherland, H. J. In Culture of Hematopoietic Cells. R. I.
- 15 Freshney, et al. eds. Vol pp. 139-162, Wiley-Liss, Inc., New York, N.Y. 1994.

#### 4.10.6 TISSUE GROWTH ACTIVITY

- A polypeptide of the present invention also may be involved in bone, cartilage, tendon, ligament and/or nerve tissue growth or regeneration, as well as in wound healing
- 20 and tissue repair and replacement, and in healing of burns, incisions and ulcers.

- A polypeptide of the present invention which induces cartilage and/or bone growth in circumstances where bone is not normally formed, has application in the healing of bone fractures and cartilage damage or defects in humans and other animals. Compositions of a polypeptide, antibody, binding partner, or other modulator of the
- 25 invention may have prophylactic use in closed as well as open fracture reduction and also in the improved fixation of artificial joints. De novo bone formation induced by an osteogenic agent contributes to the repair of congenital, trauma induced, or oncologic resection induced craniofacial defects, and also is useful in cosmetic plastic surgery.

- A polypeptide of this invention may also be involved in attracting bone-forming
- 30 cells, stimulating growth of bone-forming cells, or inducing differentiation of progenitors of bone-forming cells. Treatment of osteoporosis, osteoarthritis, bone degenerative

disorders, or periodontal disease, such as through stimulation of bone and/or cartilage repair or by blocking inflammation or processes of tissue destruction (collagenase activity, osteoclast activity, etc.) mediated by inflammatory processes may also be possible using the composition of the invention.

5           Another category of tissue regeneration activity that may involve the polypeptide of the present invention is tendon/ligament formation. Induction of tendon/ligament-like tissue or other tissue formation in circumstances where such tissue is not normally formed, has application in the healing of tendon or ligament tears, deformities and other tendon or ligament defects in humans and other animals. Such a preparation employing a  
10 tendon/ligament-like tissue inducing protein may have prophylactic use in preventing damage to tendon or ligament tissue, as well as use in the improved fixation of tendon or ligament to bone or other tissues, and in repairing defects to tendon or ligament tissue. De novo tendon/ligament-like tissue formation induced by a composition of the present invention contributes to the repair of congenital, trauma induced, or other tendon or  
15 ligament defects of other origin, and is also useful in cosmetic plastic surgery for attachment or repair of tendons or ligaments. The compositions of the present invention may provide environment to attract tendon- or ligament-forming cells, stimulate growth of tendon- or ligament-forming cells, induce differentiation of progenitors of tendon- or ligament-forming cells, or induce growth of tendon/ligament cells or progenitors *ex vivo*  
20 for return *in vivo* to effect tissue repair. The compositions of the invention may also be useful in the treatment of tendinitis, carpal tunnel syndrome and other tendon or ligament defects. The compositions may also include an appropriate matrix and/or sequestering agent as a carrier as is well known in the art.

          The compositions of the present invention may also be useful for proliferation of  
25 neural cells and for regeneration of nerve and brain tissue, i.e. for the treatment of central and peripheral nervous system diseases and neuropathies, as well as mechanical and traumatic disorders, which involve degeneration, death or trauma to neural cells or nerve tissue. More specifically, a composition may be used in the treatment of diseases of the peripheral nervous system, such as peripheral nerve injuries, peripheral neuropathy and  
30 localized neuropathies, and central nervous system diseases, such as Alzheimer's, Parkinson's disease, Huntington's disease, amyotrophic lateral sclerosis, and Shy-Drager

syndrome. Further conditions which may be treated in accordance with the present invention include mechanical and traumatic disorders, such as spinal cord disorders, head trauma and cerebrovascular diseases such as stroke. Peripheral neuropathies resulting from chemotherapy or other medical therapies may also be treatable using a composition of the invention.

Compositions of the invention may also be useful to promote better or faster closure of non-healing wounds, including without limitation pressure ulcers, ulcers associated with vascular insufficiency, surgical and traumatic wounds, and the like.

Compositions of the present invention may also be involved in the generation or regeneration of other tissues, such as organs (including, for example, pancreas, liver, intestine, kidney, skin, endothelium), muscle (smooth, skeletal or cardiac) and vascular (including vascular endothelium) tissue, or for promoting the growth of cells comprising such tissues. Part of the desired effects may be by inhibition or modulation of fibrotic scarring may allow normal tissue to regenerate. A polypeptide of the present invention may also exhibit angiogenic activity.

A composition of the present invention may also be useful for gut protection or regeneration and treatment of lung or liver fibrosis, reperfusion injury in various tissues, and conditions resulting from systemic cytokine damage.

A composition of the present invention may also be useful for promoting or inhibiting differentiation of tissues described above from precursor tissues or cells; or for inhibiting the growth of tissues described above.

Therapeutic compositions of the invention can be used in the following:

Assays for tissue generation activity include, without limitation, those described in: International Patent Publication No. WO95/16035 (bone, cartilage, tendon); International Patent Publication No. WO95/05846 (nerve, neuronal); International Patent Publication No. WO91/07491 (skin, endothelium).

Assays for wound healing activity include, without limitation, those described in: Winter, Epidermal Wound Healing, pps. 71-112 (Maibach, H. I. and Rovee, D. T., eds.), Year Book Medical Publishers, Inc., Chicago, as modified by Eaglstein and Mertz, J. Invest. Dermatol 71:382-84 (1978).

#### 4.10.7 IMMUNE STIMULATING OR SUPPRESSING ACTIVITY

A polypeptide of the present invention may also exhibit immune stimulating or immune suppressing activity, including without limitation the activities for which assays are described herein. A polynucleotide of the invention can encode a polypeptide  
5 exhibiting such activities. A protein may be useful in the treatment of various immune deficiencies and disorders (including severe combined immunodeficiency (SCID)), e.g., in regulating (up or down) growth and proliferation of T and/or B lymphocytes, as well as effecting the cytolytic activity of NK cells and other cell populations. These immune deficiencies may be genetic or be caused by viral (e.g., HIV) as well as bacterial or  
10 fungal infections, or may result from autoimmune disorders. More specifically, infectious diseases caused by viral, bacterial, fungal or other infection may be treatable using a protein of the present invention, including infections by HIV, hepatitis viruses, herpes viruses, mycobacteria, Leishmania spp., malaria spp. and various fungal infections such as candidiasis. Of course, in this regard, proteins of the present invention may also be  
15 useful where a boost to the immune system generally may be desirable, i.e., in the treatment of cancer.

Autoimmune disorders which may be treated using a protein of the present invention include, for example, connective tissue disease, multiple sclerosis, systemic lupus erythematosus, rheumatoid arthritis, autoimmune pulmonary inflammation,  
20 Guillain-Barre syndrome, autoimmune thyroiditis, insulin dependent diabetes mellitus, myasthenia gravis, graft-versus-host disease and autoimmune inflammatory eye disease. Such a protein (or antagonists thereof, including antibodies) of the present invention may also be useful in the treatment of allergic reactions and conditions (e.g., anaphylaxis, serum sickness, drug reactions, food allergies, insect venom allergies, mastocytosis,  
25 allergic rhinitis, hypersensitivity pneumonitis, urticaria, angioedema, eczema, atopic dermatitis, allergic contact dermatitis, erythema multiforme, Stevens-Johnson syndrome, allergic conjunctivitis, atopic keratoconjunctivitis, venereal keratoconjunctivitis, giant papillary conjunctivitis and contact allergies), such as asthma (particularly allergic asthma) or other respiratory problems. Other conditions, in which immune suppression is  
30 desired (including, for example, organ transplantation), may also be treatable using a protein (or antagonists thereof) of the present invention. The therapeutic effects of the

polypeptides or antagonists thereof on allergic reactions can be evaluated by in vivo animals models such as the cumulative contact enhancement test (Lastbom et al., Toxicology 125: 59-66, 1998), skin prick test (Hoffmann et al., Allergy 54: 446-54, 1999), guinea pig skin sensitization test (Vohr et al., Arch. Toxicol. 73: 501-9), and  
5 murine local lymph node assay (Kimber et al., J. Toxicol. Environ. Health 53: 563-79).

Using the proteins of the invention it may also be possible to modulate immune responses, in a number of ways. Down regulation may be in the form of inhibiting or blocking an immune response already in progress or may involve preventing the induction of an immune response. The functions of activated T cells may be inhibited by  
10 suppressing T cell responses or by inducing specific tolerance in T cells, or both. Immunosuppression of T cell responses is generally an active, non-antigen-specific, process which requires continuous exposure of the T cells to the suppressive agent. Tolerance, which involves inducing non-responsiveness or anergy in T cells, is distinguishable from immunosuppression in that it is generally antigen-specific and  
15 persists after exposure to the tolerizing agent has ceased. Operationally, tolerance can be demonstrated by the lack of a T cell response upon reexposure to specific antigen in the absence of the tolerizing agent.

Down regulating or preventing one or more antigen functions (including without limitation B lymphocyte antigen functions (such as, for example, B7)), e.g., preventing  
20 high level lymphokine synthesis by activated T cells, will be useful in situations of tissue, skin and organ transplantation and in graft-versus-host disease (GVHD). For example, blockage of T cell function should result in reduced tissue destruction in tissue transplantation. Typically, in tissue transplants, rejection of the transplant is initiated through its recognition as foreign by T cells, followed by an immune reaction that  
25 destroys the transplant. The administration of a therapeutic composition of the invention may prevent cytokine synthesis by immune cells, such as T cells, and thus acts as an immunosuppressant. Moreover, a lack of costimulation may also be sufficient to anergize the T cells, thereby inducing tolerance in a subject. Induction of long-term tolerance by B lymphocyte antigen-blocking reagents may avoid the necessity of repeated administration  
30 of these blocking reagents. To achieve sufficient immunosuppression or tolerance in a

subject, it may also be necessary to block the function of a combination of B lymphocyte antigens.

The efficacy of particular therapeutic compositions in preventing organ transplant rejection or GVHD can be assessed using animal models that are predictive of efficacy in humans. Examples of appropriate systems which can be used include allogeneic cardiac grafts in rats and xenogeneic pancreatic islet cell grafts in mice, both of which have been used to examine the immunosuppressive effects of CTLA4Ig fusion proteins in vivo as described in Lenschow et al., *Science* 257:789-792 (1992) and Turka et al., *Proc. Natl. Acad. Sci USA*, 89:11102-11105 (1992). In addition, murine models of GVHD (see Paul ed., *Fundamental Immunology*, Raven Press, New York, 1989, pp. 846-847) can be used to determine the effect of therapeutic compositions of the invention on the development of that disease.

Blocking antigen function may also be therapeutically useful for treating autoimmune diseases. Many autoimmune disorders are the result of inappropriate activation of T cells that are reactive against self tissue and which promote the production of cytokines and autoantibodies involved in the pathology of the diseases. Preventing the activation of autoreactive T cells may reduce or eliminate disease symptoms. Administration of reagents which block stimulation of T cells can be used to inhibit T cell activation and prevent production of autoantibodies or T cell-derived cytokines which may be involved in the disease process. Additionally, blocking reagents may induce antigen-specific tolerance of autoreactive T cells which could lead to long-term relief from the disease. The efficacy of blocking reagents in preventing or alleviating autoimmune disorders can be determined using a number of well-characterized animal models of human autoimmune diseases. Examples include murine experimental autoimmune encephalitis, systemic lupus erythmatosis in MRL/lpr/lpr mice or NZB hybrid mice, murine autoimmune collagen arthritis, diabetes mellitus in NOD mice and BB rats, and murine experimental myasthenia gravis (see Paul ed., *Fundamental Immunology*, Raven Press, New York, 1989, pp. 840-856).

Upregulation of an antigen function (e.g., a B lymphocyte antigen function), as a means of up regulating immune responses, may also be useful in therapy. Upregulation of immune responses may be in the form of enhancing an existing immune response or

eliciting an initial immune response. For example, enhancing an immune response may be useful in cases of viral infection, including systemic viral diseases such as influenza, the common cold, and encephalitis.

Alternatively, anti-viral immune responses may be enhanced in an infected patient  
5 by removing T cells from the patient, costimulating the T cells in vitro with viral antigen-pulsed APCs either expressing a peptide of the present invention or together with a stimulatory form of a soluble peptide of the present invention and reintroducing the in vitro activated T cells into the patient. Another method of enhancing anti-viral immune responses would be to isolate infected cells from a patient, transfect them with a nucleic  
10 acid encoding a protein of the present invention as described herein such that the cells express all or a portion of the protein on their surface, and reintroduce the transfected cells into the patient. The infected cells would now be capable of delivering a costimulatory signal to, and thereby activate, T cells in vivo.

A polypeptide of the present invention may provide the necessary stimulation  
15 signal to T cells to induce a T cell mediated immune response against the transfected tumor cells. In addition, tumor cells which lack MHC class I or MHC class II molecules, or which fail to reexpress sufficient mounts of MHC class I or MHC class II molecules, can be transfected with nucleic acid encoding all or a portion of (e.g., a cytoplasmic-domain truncated portion) of an MHC class I alpha chain protein and  $\beta_2$   
20 microglobulin protein or an MHC class II alpha chain protein and an MHC class II beta chain protein to thereby express MHC class I or MHC class II proteins on the cell surface. Expression of the appropriate class I or class II MHC in conjunction with a peptide having the activity of a B lymphocyte antigen (e.g., B7-1, B7-2, B7-3) induces a T cell mediated immune response against the transfected tumor cell. Optionally, a gene  
25 encoding an antisense construct which blocks expression of an MHC class II associated protein, such as the invariant chain, can also be cotransfected with a DNA encoding a peptide having the activity of a B lymphocyte antigen to promote presentation of tumor associated antigens and induce tumor specific immunity. Thus, the induction of a T cell mediated immune response in a human subject may be sufficient to overcome  
30 tumor-specific tolerance in the subject.



The activity of a protein of the invention may, among other means, be measured by the following methods:

Suitable assays for thymocyte or splenocyte cytotoxicity include, without limitation, those described in: *Current Protocols in Immunology*, Ed by J. E. Coligan, A. M. Kruisbeek, D. H. Margulies, E. M. Shevach, W. Strober, Pub. Greene Publishing Associates and Wiley-Interscience (Chapter 3, *In Vitro* assays for Mouse Lymphocyte Function 3.1-3.19; Chapter 7, *Immunologic studies in Humans*); Herrmann et al., *Proc. Natl. Acad. Sci. USA* 78:2488-2492, 1981; Herrmann et al., *J. Immunol.* 128:1968-1974, 1982; Handa et al., *J. Immunol.* 135:1564-1572, 1985; Takai et al., *J. Immunol.* 137:3494-3500, 1986; Takai et al., *J. Immunol.* 140:508-512, 1988; Bowman et al., *J. Virology* 61:1992-1998; Bertagnolli et al., *Cellular Immunology* 133:327-341, 1991; Brown et al., *J. Immunol.* 153:3079-3092, 1994.

Assays for T-cell-dependent immunoglobulin responses and isotype switching (which will identify, among others, proteins that modulate T-cell dependent antibody responses and that affect Th1/Th2 profiles) include, without limitation, those described in: Maliszewski, *J. Immunol.* 144:3028-3033, 1990; and Assays for B cell function: *In vitro* antibody production, Mond, J. J. and Brunswick, M. In *Current Protocols in Immunology*. J. E. e.a. Coligan eds. Vol 1 pp. 3.8.1-3.8.16, John Wiley and Sons, Toronto. 1994.

Mixed lymphocyte reaction (MLR) assays (which will identify, among others, proteins that generate predominantly Th1 and CTL responses) include, without limitation, those described in: *Current Protocols in Immunology*, Ed by J. E. Coligan, A. M. Kruisbeek, D. H. Margulies, E. M. Shevach, W. Strober, Pub. Greene Publishing Associates and Wiley-Interscience (Chapter 3, *In Vitro* assays for Mouse Lymphocyte Function 3.1-3.19; Chapter 7, *Immunologic studies in Humans*); Takai et al., *J. Immunol.* 137:3494-3500, 1986; Takai et al., *J. Immunol.* 140:508-512, 1988; Bertagnolli et al., *J. Immunol.* 149:3778-3783, 1992.

Dendritic cell-dependent assays (which will identify, among others, proteins expressed by dendritic cells that activate naive T-cells) include, without limitation, those described in: Guery et al., *J. Immunol.* 134:536-544, 1995; Inaba et al., *Journal of Experimental Medicine* 173:549-559, 1991; Macatonia et al., *Journal of Immunology*

154:5071-5079, 1995; Porgador et al., Journal of Experimental Medicine 182:255-260, 1995; Nair et al., Journal of Virology 67:4062-4069, 1993; Huang et al., Science 264:961-965, 1994; Macatonia et al., Journal of Experimental Medicine 169:1255-1264, 1989; Bhardwaj et al., Journal of Clinical Investigation 94:797-807, 1994; and Inaba et al., Journal of Experimental Medicine 172:631-640, 1990.

Assays for lymphocyte survival/apoptosis (which will identify, among others, proteins that prevent apoptosis after superantigen induction and proteins that regulate lymphocyte homeostasis) include, without limitation, those described in: Darzynkiewicz et al., Cytometry 13:795-808, 1992; Gorczyca et al., Leukemia 7:659-670, 1993; Gorczyca et al., Cancer Research 53:1945-1951, 1993; Itoh et al., Cell 66:233-243, 1991; Zacharchuk, Journal of Immunology 145:4037-4045, 1990; Zamai et al., Cytometry 14:891-897, 1993; Gorczyca et al., International Journal of Oncology 1:639-648, 1992.

Assays for proteins that influence early steps of T-cell commitment and development include, without limitation, those described in: Antica et al., Blood 84:111-117, 1994; Fine et al., Cellular Immunology 155:111-122, 1994; Galy et al., Blood 85:2770-2778, 1995; Toki et al., Proc. Nat. Acad Sci. USA 88:7548-7551, 1991.

#### 4.10.8 ACTIVIN/INHIBIN ACTIVITY

A polypeptide of the present invention may also exhibit activin- or inhibin-related activities. A polynucleotide of the invention may encode a polypeptide exhibiting such characteristics. Inhibins are characterized by their ability to inhibit the release of follicle stimulating hormone (FSH), while activins are characterized by their ability to stimulate the release of follicle stimulating hormone (FSH). Thus, a polypeptide of the present invention, alone or in heterodimers with a member of the inhibin family, may be useful as a contraceptive based on the ability of inhibins to decrease fertility in female mammals and decrease spermatogenesis in male mammals. Administration of sufficient amounts of other inhibins can induce infertility in these mammals. Alternatively, the polypeptide of the invention, as a homodimer or as a heterodimer with other protein subunits of the inhibin group, may be useful as a fertility inducing therapeutic, based upon the ability of activin molecules in stimulating FSH release from cells of the anterior pituitary. See, for example, U.S. Pat. No. 4,798,885. A polypeptide of the invention may

also be useful for advancement of the onset of fertility in sexually immature mammals, so as to increase the lifetime reproductive performance of domestic animals such as, but not limited to, cows, sheep and pigs.

5 The activity of a polypeptide of the invention may, among other means, be measured by the following methods.

Assays for activin/inhibin activity include, without limitation, those described in: Vale et al., *Endocrinology* 91:562-572, 1972; Ling et al., *Nature* 321:779-782, 1986; Vale et al., *Nature* 321:776-779, 1986; Mason et al., *Nature* 318:659-663, 1985; Forage et al., *Proc. Natl. Acad. Sci. USA* 83:3091-3095, 1986.

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#### 4.10.9 CHEMOTACTIC/CHEMOKINETIC ACTIVITY

A polypeptide of the present invention may be involved in chemotactic or chemokinetic activity for mammalian cells, including, for example, monocytes, fibroblasts, neutrophils, T-cells, mast cells, eosinophils, epithelial and/or endothelial  
15 cells. A polynucleotide of the invention can encode a polypeptide exhibiting such attributes. Chemotactic and chemokinetic receptor activation can be used to mobilize or attract a desired cell population to a desired site of action. Chemotactic or chemokinetic compositions (e.g. proteins, antibodies, binding partners, or modulators of the invention) provide particular advantages in treatment of wounds and other trauma to tissues, as well  
20 as in treatment of localized infections. For example, attraction of lymphocytes, monocytes or neutrophils to tumors or sites of infection may result in improved immune responses against the tumor or infecting agent.

A protein or peptide has chemotactic activity for a particular cell population if it can stimulate, directly or indirectly, the directed orientation or movement of such cell  
25 population. Preferably, the protein or peptide has the ability to directly stimulate directed movement of cells. Whether a particular protein has chemotactic activity for a population of cells can be readily determined by employing such protein or peptide in any known assay for cell chemotaxis.

Therapeutic compositions of the invention can be used in the following:

30 Assays for chemotactic activity (which will identify proteins that induce or prevent chemotaxis) consist of assays that measure the ability of a protein to induce the

migration of cells across a membrane as well as the ability of a protein to induce the adhesion of one cell population to another cell population. Suitable assays for movement and adhesion include, without limitation, those described in: Current Protocols in Immunology, Ed by J. E. Coligan, A. M. Kruisbeek, D. H. Marguiles, E. M. Shevach, W. Strober, Pub. Greene Publishing Associates and Wiley-Interscience (Chapter 6.12, Measurement of alpha and beta Chemokines 6.12.1-6.12.28; Taub et al. J. Clin. Invest. 95:1370-1376, 1995; Lind et al. APMIS 103:140-146, 1995; Muller et al Eur. J. Immunol. 25:1744-1748; Gruber et al. J. of Immunol. 152:5860-5867, 1994; Johnston et al. J. of Immunol. 153:1762-1768, 1994.

#### **4.10.10 HEMOSTATIC AND THROMBOLYTIC ACTIVITY**

A polypeptide of the invention may also be involved in hemostasis or thrombolysis or thrombosis. A polynucleotide of the invention can encode a polypeptide exhibiting such attributes. Compositions may be useful in treatment of various coagulation disorders (including hereditary disorders, such as hemophilias) or to enhance coagulation and other hemostatic events in treating wounds resulting from trauma, surgery or other causes. A composition of the invention may also be useful for dissolving or inhibiting formation of thromboses and for treatment and prevention of conditions resulting therefrom (such as, for example, infarction of cardiac and central nervous system vessels (e.g., stroke).

Therapeutic compositions of the invention can be used in the following:

Assay for hemostatic and thrombolytic activity include, without limitation, those described in: Linet et al., J. Clin. Pharmacol. 26:131-140, 1986; Burdick et al., Thrombosis Res. 45:413-419, 1987; Humphrey et al., Fibrinolysis 5:71-79 (1991); Schaub, Prostaglandins 35:467-474, 1988.

#### **4.10.11 CANCER DIAGNOSIS AND THERAPY**

Polypeptides of the invention may be involved in cancer cell generation, proliferation or metastasis. Detection of the presence or amount of polynucleotides or polypeptides of the invention may be useful for the diagnosis and/or prognosis of one or more types of cancer. For example, the presence or increased expression of a

polynucleotide/polypeptide of the invention may indicate a hereditary risk of cancer, a precancerous condition, or an ongoing malignancy. Conversely, a defect in the gene or absence of the polypeptide may be associated with a cancer condition. Identification of single nucleotide polymorphisms associated with cancer or a predisposition to cancer  
5 may also be useful for diagnosis or prognosis.

Cancer treatments promote tumor regression by inhibiting tumor cell proliferation, inhibiting angiogenesis (growth of new blood vessels that is necessary to support tumor growth) and/or prohibiting metastasis by reducing tumor cell motility or invasiveness. Therapeutic compositions of the invention may be effective in adult and  
10 pediatric oncology including in solid phase tumors/malignancies, locally advanced tumors, human soft tissue sarcomas, metastatic cancer, including lymphatic metastases, blood cell malignancies including multiple myeloma, acute and chronic leukemias, and lymphomas, head and neck cancers including mouth cancer, larynx cancer and thyroid cancer, lung cancers including small cell carcinoma and non-small cell cancers, breast  
15 cancers including small cell carcinoma and ductal carcinoma, gastrointestinal cancers including esophageal cancer, stomach cancer, colon cancer, colorectal cancer and polyps associated with colorectal neoplasia, pancreatic cancers, liver cancer, urologic cancers including bladder cancer and prostate cancer, malignancies of the female genital tract including ovarian carcinoma, uterine (including endometrial) cancers, and solid tumor in  
20 the ovarian follicle, kidney cancers including renal cell carcinoma, brain cancers including intrinsic brain tumors, neuroblastoma, astrocytic brain tumors, gliomas, metastatic tumor cell invasion in the central nervous system, bone cancers including osteomas, skin cancers including malignant melanoma, tumor progression of human skin keratinocytes, squamous cell carcinoma, basal cell carcinoma, hemangiopericytoma and  
25 Kaposi's sarcoma.

Polypeptides, polynucleotides, or modulators of polypeptides of the invention (including inhibitors and stimulators of the biological activity of the polypeptide of the invention) may be administered to treat cancer. Therapeutic compositions can be administered in therapeutically effective dosages alone or in combination with adjuvant  
30 cancer therapy such as surgery, chemotherapy, radiotherapy, thermotherapy, and laser therapy, and may provide a beneficial effect, e.g. reducing tumor size, slowing rate of

tumor growth, inhibiting metastasis, or otherwise improving overall clinical condition, without necessarily eradicating the cancer.

The composition can also be administered in therapeutically effective amounts as a portion of an anti-cancer cocktail. An anti-cancer cocktail is a mixture of the  
5 polypeptide or modulator of the invention with one or more anti-cancer drugs in addition to a pharmaceutically acceptable carrier for delivery. The use of anti-cancer cocktails as a cancer treatment is routine. Anti-cancer drugs that are well known in the art and can be used as a treatment in combination with the polypeptide or modulator of the invention include: Actinomycin D, Aminoglutethimide, Asparaginase, Bleomycin, Busulfan,  
10 Carboplatin, Carmustine, Chlorambucil, Cisplatin (cis-DDP), Cyclophosphamide, Cytarabine HCl (Cytosine arabinoside), Dacarbazine, Dactinomycin, Daunorubicin HCl, Doxorubicin HCl, Estramustine phosphate sodium, Etoposide (V16-213), Floxuridine, 5-Fluorouracil (5-Fu), Flutamide, Hydroxyurea (hydroxycarbamide), Ifosfamide, Interferon Alpha-2a, Interferon Alpha-2b, Leuprolide acetate (LHRH-releasing factor analog),  
15 Lomustine, Mechlorethamine HCl (nitrogen mustard), Melphalan, Mercaptopurine, Mesna, Methotrexate (MTX), Mitomycin, Mitoxantrone HCl, Octreotide, Plicamycin, Procarbazine HCl, Streptozocin, Tamoxifen citrate, Thioguanine, Thiotepa, Vinblastine sulfate, Vincristine sulfate, Amsacrine, Azacitidine, Hexamethylmelamine, Interleukin-2, Mitoguazone, Pentostatin, Semustine, Teniposide, and Vindesine sulfate.

20 In addition, therapeutic compositions of the invention may be used for prophylactic treatment of cancer. There are hereditary conditions and/or environmental situations (e.g. exposure to carcinogens) known in the art that predispose an individual to developing cancers. Under these circumstances, it may be beneficial to treat these individuals with therapeutically effective doses of the polypeptide of the invention to  
25 reduce the risk of developing cancers.

*In vitro* models can be used to determine the effective doses of the polypeptide of the invention as a potential cancer treatment. These *in vitro* models include proliferation assays of cultured tumor cells, growth of cultured tumor cells in soft agar (see Freshney, (1987) Culture of Animal Cells: A Manual of Basic Technique, Wiley-Liss, New York,  
30 NY Ch 18 and Ch 21), tumor systems in nude mice as described in Giovanella et al., J. Natl. Can. Inst., 52: 921-30 (1974), mobility and invasive potential of tumor cells in

Boyden Chamber assays as described in Pilkington et al., *Anticancer Res.*, 17: 4107-9 (1997), and angiogenesis assays such as induction of vascularization of the chick chorioallantoic membrane or induction of vascular endothelial cell migration as described in Ribatta et al., *Intl. J. Dev. Biol.*, 40: 1189-97 (1999) and Li et al., *Clin. Exp. Metastasis*, 17:423-9 (1999), respectively. Suitable tumor cells lines are available, e.g. from American Type Tissue Culture Collection catalogs.

#### 4.10.12 RECEPTOR/LIGAND ACTIVITY

A polypeptide of the present invention may also demonstrate activity as receptor, receptor ligand or inhibitor or agonist of receptor/ligand interactions. A polynucleotide of the invention can encode a polypeptide exhibiting such characteristics. Examples of such receptors and ligands include, without limitation, cytokine receptors and their ligands, receptor kinases and their ligands, receptor phosphatases and their ligands, receptors involved in cell-cell interactions and their ligands (including without limitation, cellular adhesion molecules (such as selectins, integrins and their ligands) and receptor/ligand pairs involved in antigen presentation, antigen recognition and development of cellular and humoral immune responses. Receptors and ligands are also useful for screening of potential peptide or small molecule inhibitors of the relevant receptor/ligand interaction. A protein of the present invention (including, without limitation, fragments of receptors and ligands) may themselves be useful as inhibitors of receptor/ligand interactions.

The activity of a polypeptide of the invention may, among other means, be measured by the following methods:

Suitable assays for receptor-ligand activity include without limitation those described in: *Current Protocols in Immunology*, Ed by J. E. Coligan, A. M. Kruisbeek, D. H. Margulies, E. M. Shevach, W. Strober, Pub. Greene Publishing Associates and Wiley- Interscience (Chapter 7.28, Measurement of Cellular Adhesion under static conditions 7.28.1- 7.28.22), Takai et al., *Proc. Natl. Acad. Sci. USA* 84:6864-6868, 1987; Bierer et al., *J. Exp. Med.* 168:1145-1156, 1988; Rosenstein et al., *J. Exp. Med.* 169:149-160 1989; Stoltenborg et al., *J. Immunol. Methods* 175:59-68, 1994; Stitt et al., *Cell* 80:661-670, 1995.

By way of example, the polypeptides of the invention may be used as a receptor for a ligand(s) thereby transmitting the biological activity of that ligand(s). Ligands may be identified through binding assays, affinity chromatography, dihybrid screening assays, BIAcore assays, gel overlay assays, or other methods known in the art.

5        Studies characterizing drugs or proteins as agonist or antagonist or partial agonists or a partial antagonist require the use of other proteins as competing ligands. The polypeptides of the present invention or ligand(s) thereof may be labeled by being coupled to radioisotopes, colorimetric molecules or a toxin molecules by conventional methods. ("Guide to Protein Purification" Murray P. Deutscher (ed) Methods in  
10    Enzymology Vol. 182 (1990) Academic Press, Inc. San Diego). Examples of radioisotopes include, but are not limited to, tritium and carbon-14 . Examples of colorimetric molecules include, but are not limited to, fluorescent molecules such as fluorescamine, or rhodamine or other colorimetric molecules. Examples of toxins include, but are not limited, to ricin.

15

#### **4.10.13        DRUG SCREENING**

This invention is particularly useful for screening chemical compounds by using the novel polypeptides or binding fragments thereof in any of a variety of drug screening techniques. The polypeptides or fragments employed in such a test may either be free in  
20    solution, affixed to a solid support, borne on a cell surface or located intracellularly. One method of drug screening utilizes eukaryotic or prokaryotic host cells which are stably transformed with recombinant nucleic acids expressing the polypeptide or a fragment thereof. Drugs are screened against such transformed cells in competitive binding assays. Such cells, either in viable or fixed form, can be used for standard binding assays. One  
25    may measure, for example, the formation of complexes between polypeptides of the invention or fragments and the agent being tested or examine the diminution in complex formation between the novel polypeptides and an appropriate cell line, which are well known in the art.

Sources for test compounds that may be screened for ability to bind to or  
30    modulate (i.e., increase or decrease) the activity of polypeptides of the invention include (1) inorganic and organic chemical libraries, (2) natural product libraries, and (3)



combinatorial libraries comprised of either random or mimetic peptides, oligonucleotides or organic molecules.

Chemical libraries may be readily synthesized or purchased from a number of commercial sources, and may include structural analogs of known compounds or  
5 compounds that are identified as "hits" or "leads" via natural product screening.

The sources of natural product libraries are microorganisms (including bacteria and fungi), animals, plants or other vegetation, or marine organisms, and libraries of mixtures for screening may be created by: (1) fermentation and extraction of broths from soil, plant or marine microorganisms or (2) extraction of the organisms themselves.  
10 Natural product libraries include polyketides, non-ribosomal peptides, and (non-naturally occurring) variants thereof. For a review, see *Science* 282:63-68 (1998).

Combinatorial libraries are composed of large numbers of peptides, oligonucleotides or organic compounds and can be readily prepared by traditional automated synthesis methods, PCR, cloning or proprietary synthetic methods. Of  
15 particular interest are peptide and oligonucleotide combinatorial libraries. Still other libraries of interest include peptide, protein, peptidomimetic, multiparallel synthetic collection, recombinatorial, and polypeptide libraries. For a review of combinatorial chemistry and libraries created therefrom, see Myers, *Curr. Opin. Biotechnol.* 8:701-707 (1997). For reviews and examples of peptidomimetic libraries, see Al-Obeidi et al., *Mol.*  
20 *Biotechnol.* 9(3):205-23 (1998); Hruby et al., *Curr Opin Chem Biol*, 1(1):114-19 (1997); Dorner et al., *Bioorg Med Chem*, 4(5):709-15 (1996) (alkylated dipeptides).

Identification of modulators through use of the various libraries described herein permits modification of the candidate "hit" (or "lead") to optimize the capacity of the "hit" to bind a polypeptide of the invention. The molecules identified in the binding assay  
25 are then tested for antagonist or agonist activity in *in vivo* tissue culture or animal models that are well known in the art. In brief, the molecules are titrated into a plurality of cell cultures or animals and then tested for either cell/animal death or prolonged survival of the animal/cells.

The binding molecules thus identified may be complexed with toxins, e.g., ricin  
30 or cholera, or with other compounds that are toxic to cells such as radioisotopes. The toxin-binding molecule complex is then targeted to a tumor or other cell by the specificity

of the binding molecule for a polypeptide of the invention. Alternatively, the binding molecules may be complexed with imaging agents for targeting and imaging purposes.

#### 4.10.14 ASSAY FOR RECEPTOR ACTIVITY

5 The invention also provides methods to detect specific binding of a polypeptide e.g. a ligand or a receptor. The art provides numerous assays particularly useful for identifying previously unknown binding partners for receptor polypeptides of the invention. For example, expression cloning using mammalian or bacterial cells, or dihybrid screening assays can be used to identify polynucleotides encoding binding  
10 partners. As another example, affinity chromatography with the appropriate immobilized polypeptide of the invention can be used to isolate polypeptides that recognize and bind polypeptides of the invention. There are a number of different libraries used for the identification of compounds, and in particular small molecules, that modulate (*i.e.*, increase or decrease) biological activity of a polypeptide of the invention. Ligands for  
15 receptor polypeptides of the invention can also be identified by adding exogenous ligands, or cocktails of ligands to two cells populations that are genetically identical except for the expression of the receptor of the invention: one cell population expresses the receptor of the invention whereas the other does not. The response of the two cell populations to the addition of ligands(s) are then compared. Alternatively, an expression  
20 library can be co-expressed with the polypeptide of the invention in cells and assayed for an autocrine response to identify potential ligand(s). As still another example, BIAcore assays, gel overlay assays, or other methods known in the art can be used to identify binding partner polypeptides, including, (1) organic and inorganic chemical libraries, (2) natural product libraries, and (3) combinatorial libraries comprised of random peptides,  
25 oligonucleotides or organic molecules.

The role of downstream intracellular signaling molecules in the signaling cascade of the polypeptide of the invention can be determined. For example, a chimeric protein in which the cytoplasmic domain of the polypeptide of the invention is fused to the extracellular portion of a protein, whose ligand has been identified, is produced in a host  
30 cell. The cell is then incubated with the ligand specific for the extracellular portion of the chimeric protein, thereby activating the chimeric receptor. Known downstream proteins

involved in intracellular signaling can then be assayed for expected modifications i.e. phosphorylation. Other methods known to those in the art can also be used to identify signaling molecules involved in receptor activity.

5           **4.10.15           ANTI-INFLAMMATORY ACTIVITY**

Compositions of the present invention may also exhibit anti-inflammatory activity. The anti-inflammatory activity may be achieved by providing a stimulus to cells involved in the inflammatory response, by inhibiting or promoting cell-cell interactions (such as, for example, cell adhesion), by inhibiting or promoting chemotaxis of cells  
10 involved in the inflammatory process, inhibiting or promoting cell extravasation, or by stimulating or suppressing production of other factors which more directly inhibit or promote an inflammatory response. Compositions with such activities can be used to treat inflammatory conditions including chronic or acute conditions), including without limitation intimation associated with infection (such as septic shock, sepsis or systemic  
15 inflammatory response syndrome (SIRS)), ischemia-reperfusion injury, endotoxin lethality, arthritis, complement-mediated hyperacute rejection, nephritis, cytokine or chemokine-induced lung injury, inflammatory bowel disease, Crohn's disease or resulting from over production of cytokines such as TNF or IL-1. Compositions of the invention may also be useful to treat anaphylaxis and hypersensitivity to an antigenic substance or  
20 material. Compositions of this invention may be utilized to prevent or treat conditions such as, but not limited to, sepsis, acute pancreatitis, endotoxin shock, cytokine induced shock, rheumatoid arthritis, chronic inflammatory arthritis, pancreatic cell damage from diabetes mellitus type 1, graft versus host disease, inflammatory bowel disease, inflammation associated with pulmonary disease, other autoimmune disease or  
25 inflammatory disease, an antiproliferative agent such as for acute or chronic myleogenous leukemia or in the prevention of premature labor secondary to intrauterine infections.

**4.10.16           LEUKEMIAS**

Leukemias and related disorders may be treated or prevented by administration of  
30 a therapeutic that promotes or inhibits function of the polynucleotides and/or polypeptides of the invention. Such leukemias and related disorders include but are not

- limited to acute leukemia, acute lymphocytic leukemia, acute myelocytic leukemia, myeloblastic, promyelocytic, myelomonocytic, monocytic, erythroleukemia, chronic leukemia, chronic myelocytic (granulocytic) leukemia and chronic lymphocytic leukemia (for a review of such disorders, see Fishman et al., 1985, Medicine, 2d Ed., J.B. Lippincott Co., Philadelphia).

#### 4.10.17 NERVOUS SYSTEM DISORDERS

- Nervous system disorders, involving cell types which can be tested for efficacy of intervention with compounds that modulate the activity of the polynucleotides and/or polypeptides of the invention, and which can be treated upon thus observing an indication of therapeutic utility, include but are not limited to nervous system injuries, and diseases or disorders which result in either a disconnection of axons, a diminution or degeneration of neurons, or demyelination. Nervous system lesions which may be treated in a patient (including human and non-human mammalian patients) according to the invention include but are not limited to the following lesions of either the central (including spinal cord, brain) or peripheral nervous systems:
- (i) traumatic lesions, including lesions caused by physical injury or associated with surgery, for example, lesions which sever a portion of the nervous system, or compression injuries;
  - (ii) ischemic lesions, in which a lack of oxygen in a portion of the nervous system results in neuronal injury or death, including cerebral infarction or ischemia, or spinal cord infarction or ischemia;
  - (iii) infectious lesions, in which a portion of the nervous system is destroyed or injured as a result of infection, for example, by an abscess or associated with infection by human immunodeficiency virus, herpes zoster, or herpes simplex virus or with Lyme disease, tuberculosis, syphilis;
  - (iv) degenerative lesions, in which a portion of the nervous system is destroyed or injured as a result of a degenerative process including but not limited to degeneration associated with Parkinson's disease, Alzheimer's disease, Huntington's chorea, or amyotrophic lateral sclerosis;

(v) lesions associated with nutritional diseases or disorders, in which a portion of the nervous system is destroyed or injured by a nutritional disorder or disorder of metabolism including but not limited to, vitamin B12 deficiency, folic acid deficiency, Wernicke disease, tobacco-alcohol amblyopia, Marchiafava-Bignami disease (primary  
5 degeneration of the corpus callosum), and alcoholic cerebellar degeneration;

(vi) neurological lesions associated with systemic diseases including but not limited to diabetes (diabetic neuropathy, Bell's palsy), systemic lupus erythematosus, carcinoma, or sarcoidosis;

(vii) lesions caused by toxic substances including alcohol, lead, or particular  
10 neurotoxins; and

(viii) demyelinated lesions in which a portion of the nervous system is destroyed or injured by a demyelinating disease including but not limited to multiple sclerosis, human immunodeficiency virus-associated myelopathy, transverse myelopathy or various etiologies, progressive multifocal leukoencephalopathy, and central pontine  
15 myelinolysis.

Therapeutics which are useful according to the invention for treatment of a nervous system disorder may be selected by testing for biological activity in promoting the survival or differentiation of neurons. For example, and not by way of limitation, therapeutics which elicit any of the following effects may be useful according to the  
20 invention:

- (i) increased survival time of neurons in culture;
- (ii) increased sprouting of neurons in culture or *in vivo*;
- (iii) increased production of a neuron-associated molecule in culture or *in vivo*,  
*e.g.*, choline acetyltransferase or acetylcholinesterase with respect to motor neurons; or  
25 (iv) decreased symptoms of neuron dysfunction *in vivo*.

Such effects may be measured by any method known in the art. In preferred, non-limiting embodiments, increased survival of neurons may be measured by the method set forth in Arakawa et al. (1990, J. Neurosci. 10:3507-3515); increased sprouting of neurons may be detected by methods set forth in Pestronk et al. (1980, Exp. Neurol.  
30 70:65-82) or Brown et al. (1981, Ann. Rev. Neurosci. 4:17-42); increased production of neuron-associated molecules may be measured by bioassay, enzymatic assay, antibody

binding, Northern blot assay, *etc.*, depending on the molecule to be measured; and motor neuron dysfunction may be measured by assessing the physical manifestation of motor neuron disorder, *e.g.*, weakness, motor neuron conduction velocity, or functional disability.

- 5           In specific embodiments, motor neuron disorders that may be treated according to the invention include but are not limited to disorders such as infarction, infection, exposure to toxin, trauma, surgical damage, degenerative disease or malignancy that may affect motor neurons as well as other components of the nervous system, as well as disorders that selectively affect neurons such as amyotrophic lateral sclerosis, and
- 10       including but not limited to progressive spinal muscular atrophy, progressive bulbar palsy, primary lateral sclerosis, infantile and juvenile muscular atrophy, progressive bulbar paralysis of childhood (Fazio-Londe syndrome), poliomyelitis and the post polio syndrome, and Hereditary Motorsensory Neuropathy (Charcot-Marie-Tooth Disease).

15           **4.10.18           OTHER ACTIVITIES**

- A polypeptide of the invention may also exhibit one or more of the following additional activities or effects: inhibiting the growth, infection or function of, or killing, infectious agents, including, without limitation, bacteria, viruses, fungi and other parasites; effecting (suppressing or enhancing) bodily characteristics, including, without
- 20       limitation, height, weight, hair color, eye color, skin, fat to lean ratio or other tissue pigmentation, or organ or body part size or shape (such as, for example, breast augmentation or diminution, change in bone form or shape); effecting biorhythms or circadian cycles or rhythms; effecting the fertility of male or female subjects; effecting the metabolism, catabolism, anabolism, processing, utilization, storage or elimination of
- 25       dietary fat, lipid, protein, carbohydrate, vitamins, minerals, co-factors or other nutritional factors or component(s); effecting behavioral characteristics, including, without limitation, appetite, libido, stress, cognition (including cognitive disorders), depression (including depressive disorders) and violent behaviors; providing analgesic effects or other pain reducing effects; promoting differentiation and growth of embryonic stem cells
- 30       in lineages other than hematopoietic lineages; hormonal or endocrine activity; in the case of enzymes, correcting deficiencies of the enzyme and treating deficiency-related

diseases; treatment of hyperproliferative disorders (such as, for example, psoriasis); immunoglobulin-like activity (such as, for example, the ability to bind antigens or complement); and the ability to act as an antigen in a vaccine composition to raise an immune response against such protein or another material or entity which is cross-reactive with such protein.

#### 4.10.19 IDENTIFICATION OF POLYMORPHISMS

The demonstration of polymorphisms makes possible the identification of such polymorphisms in human subjects and the pharmacogenetic use of this information for diagnosis and treatment. Such polymorphisms may be associated with, e.g., differential predisposition or susceptibility to various disease states (such as disorders involving inflammation or immune response) or a differential response to drug administration, and this genetic information can be used to tailor preventive or therapeutic treatment appropriately. For example, the existence of a polymorphism associated with a predisposition to inflammation or autoimmune disease makes possible the diagnosis of this condition in humans by identifying the presence of the polymorphism.

Polymorphisms can be identified in a variety of ways known in the art which all generally involve obtaining a sample from a patient, analyzing DNA from the sample, optionally involving isolation or amplification of the DNA, and identifying the presence of the polymorphism in the DNA. For example, PCR may be used to amplify an appropriate fragment of genomic DNA which may then be sequenced. Alternatively, the DNA may be subjected to allele-specific oligonucleotide hybridization (in which appropriate oligonucleotides are hybridized to the DNA under conditions permitting detection of a single base mismatch) or to a single nucleotide extension assay (in which an oligonucleotide that hybridizes immediately adjacent to the position of the polymorphism is extended with one or more labeled nucleotides). In addition, traditional restriction fragment length polymorphism analysis (using restriction enzymes that provide differential digestion of the genomic DNA depending on the presence or absence of the polymorphism) may be performed. Arrays with nucleotide sequences of the present invention can be used to detect polymorphisms. The array can comprise modified nucleotide sequences of the present invention in order to detect the nucleotide sequences

of the present invention. In the alternative, any one of the nucleotide sequences of the present invention can be placed on the array to detect changes from those sequences.

Alternatively a polymorphism resulting in a change in the amino acid sequence could also be detected by detecting a corresponding change in amino acid sequence of the protein, e.g., by an antibody specific to the variant sequence.

#### 4.10.20 ARTHRITIS AND INFLAMMATION

The immunosuppressive effects of the compositions of the invention against rheumatoid arthritis is determined in an experimental animal model system. The experimental model system is adjuvant induced arthritis in rats, and the protocol is described by J. Holoshitz, et al., 1983, Science, 219:56, or by B. Waksman et al., 1963, Int. Arch. Allergy Appl. Immunol., 23:129. Induction of the disease can be caused by a single injection, generally intradermally, of a suspension of killed Mycobacterium tuberculosis in complete Freund's adjuvant (CFA). The route of injection can vary, but rats may be injected at the base of the tail with an adjuvant mixture. The polypeptide is administered in phosphate buffered solution (PBS) at a dose of about 1-5 mg/kg. The control consists of administering PBS only.

The procedure for testing the effects of the test compound would consist of intradermally injecting killed Mycobacterium tuberculosis in CFA followed by immediately administering the test compound and subsequent treatment every other day until day 24. At 14, 15, 18, 20, 22, and 24 days after injection of Mycobacterium CFA, an overall arthritis score may be obtained as described by J. Holoskitz above. An analysis of the data would reveal that the test compound would have a dramatic affect on the swelling of the joints as measured by a decrease of the arthritis score.

#### 4.11 THERAPEUTIC METHODS

The compositions (including polypeptide fragments, analogs, variants and antibodies or other binding partners or modulators including antisense polynucleotides) of the invention have numerous applications in a variety of therapeutic methods. Examples of therapeutic applications include, but are not limited to, those exemplified herein.



#### 4.11.1 EXAMPLE

One embodiment of the invention is the administration of an effective amount of the polypeptides or other composition of the invention to individuals affected by a disease or disorder that can be modulated by regulating the peptides of the invention. While the mode of administration is not particularly important, parenteral administration is preferred. An exemplary mode of administration is to deliver an intravenous bolus. The dosage of the polypeptides or other composition of the invention will normally be determined by the prescribing physician. It is to be expected that the dosage will vary according to the age, weight, condition and response of the individual patient. Typically, the amount of polypeptide administered per dose will be in the range of about 0.01  $\mu\text{g/kg}$  to 100 mg/kg of body weight, with the preferred dose being about 0.1  $\mu\text{g/kg}$  to 10 mg/kg of patient body weight. For parenteral administration, polypeptides of the invention will be formulated in an injectable form combined with a pharmaceutically acceptable parenteral vehicle. Such vehicles are well known in the art and examples include water, saline, Ringer's solution, dextrose solution, and solutions consisting of small amounts of the human serum albumin. The vehicle may contain minor amounts of additives that maintain the isotonicity and stability of the polypeptide or other active ingredient. The preparation of such solutions is within the skill of the art.

#### 4.12 PHARMACEUTICAL FORMULATIONS AND ROUTES OF ADMINISTRATION

A protein or other composition of the present invention (from whatever source derived, including without limitation from recombinant and non-recombinant sources and including antibodies and other binding partners of the polypeptides of the invention) may be administered to a patient in need, by itself, or in pharmaceutical compositions where it is mixed with suitable carriers or excipient(s) at doses to treat or ameliorate a variety of disorders. Such a composition may optionally contain (in addition to protein or other active ingredient and a carrier) diluents, fillers, salts, buffers, stabilizers, solubilizers, and other materials well known in the art. The term "pharmaceutically acceptable" means a non-toxic material that does not interfere with the effectiveness of the biological activity

of the active ingredient(s). The characteristics of the carrier will depend on the route of administration. The pharmaceutical composition of the invention may also contain cytokines, lymphokines, or other hematopoietic factors such as M-CSF, GM-CSF, TNF, IL-1, IL-2, IL-3, IL-4, IL-5, IL-6, IL-7, IL-8, IL-9, IL-10, IL-11, IL-12, IL-13, IL-14, IL-15, IFN, TNF0, TNF1, TNF2, G-CSF, Meg-CSF, thrombopoietin, stem cell factor, and erythropoietin. In further compositions, proteins of the invention may be combined with other agents beneficial to the treatment of the disease or disorder in question. These agents include various growth factors such as epidermal growth factor (EGF), platelet-derived growth factor (PDGF), transforming growth factors (TGF- $\alpha$  and TGF- $\beta$ ), insulin-like growth factor (IGF), as well as cytokines described herein.

The pharmaceutical composition may further contain other agents which either enhance the activity of the protein or other active ingredient or complement its activity or use in treatment. Such additional factors and/or agents may be included in the pharmaceutical composition to produce a synergistic effect with protein or other active ingredient of the invention, or to minimize side effects. Conversely, protein or other active ingredient of the present invention may be included in formulations of the particular clotting factor, cytokine, lymphokine, other hematopoietic factor, thrombolytic or anti-thrombotic factor, or anti-inflammatory agent to minimize side effects of the clotting factor, cytokine, lymphokine, other hematopoietic factor, thrombolytic or anti-thrombotic factor, or anti-inflammatory agent (such as IL-1Ra, IL-1 Hy1, IL-1 Hy2, anti-TNF, corticosteroids, immunosuppressive agents). A protein of the present invention may be active in multimers (e.g., heterodimers or homodimers) or complexes with itself or other proteins. As a result, pharmaceutical compositions of the invention may comprise a protein of the invention in such multimeric or complexed form.

As an alternative to being included in a pharmaceutical composition of the invention including a first protein, a second protein or a therapeutic agent may be concurrently administered with the first protein (e.g., at the same time, or at differing times provided that therapeutic concentrations of the combination of agents is achieved at the treatment site). Techniques for formulation and administration of the compounds of the instant application may be found in "Remington's Pharmaceutical Sciences," Mack Publishing Co., Easton, PA, latest edition. A therapeutically effective dose further refers

to that amount of the compound sufficient to result in amelioration of symptoms, *e.g.*, treatment, healing, prevention or amelioration of the relevant medical condition, or an increase in rate of treatment, healing, prevention or amelioration of such conditions.

When applied to an individual active ingredient, administered alone, a therapeutically effective dose refers to that ingredient alone. When applied to a combination, a therapeutically effective dose refers to combined amounts of the active ingredients that result in the therapeutic effect, whether administered in combination, serially or simultaneously.

In practicing the method of treatment or use of the present invention, a therapeutically effective amount of protein or other active ingredient of the present invention is administered to a mammal having a condition to be treated. Protein or other active ingredient of the present invention may be administered in accordance with the method of the invention either alone or in combination with other therapies such as treatments employing cytokines, lymphokines or other hematopoietic factors. When co-administered with one or more cytokines, lymphokines or other hematopoietic factors, protein or other active ingredient of the present invention may be administered either simultaneously with the cytokine(s), lymphokine(s), other hematopoietic factor(s), thrombolytic or anti-thrombotic factors, or sequentially. If administered sequentially, the attending physician will decide on the appropriate sequence of administering protein or other active ingredient of the present invention in combination with cytokine(s), lymphokine(s), other hematopoietic factor(s), thrombolytic or anti-thrombotic factors.

#### 4.12.1 ROUTES OF ADMINISTRATION

Suitable routes of administration may, for example, include oral, rectal, transmucosal, or intestinal administration; parenteral delivery, including intramuscular, subcutaneous, intramedullary injections, as well as intrathecal, direct intraventricular, intravenous, intraperitoneal, intranasal, or intraocular injections. Administration of protein or other active ingredient of the present invention used in the pharmaceutical composition or to practice the method of the present invention can be carried out in a variety of conventional ways, such as oral ingestion, inhalation, topical application or

cutaneous, subcutaneous, intraperitoneal, parenteral or intravenous injection. Intravenous administration to the patient is preferred.

Alternately, one may administer the compound in a local rather than systemic manner, for example, via injection of the compound directly into a arthritic joints or in  
5 fibrotic tissue, often in a depot or sustained release formulation. In order to prevent the scarring process frequently occurring as complication of glaucoma surgery, the compounds may be administered topically, for example, as eye drops. Furthermore, one may administer the drug in a targeted drug delivery system, for example, in a liposome coated with a specific antibody, targeting, for example, arthritic or fibrotic tissue. The  
10 liposomes will be targeted to and taken up selectively by the afflicted tissue.

The polypeptides of the invention are administered by any route that delivers an effective dosage to the desired site of action. The determination of a suitable route of administration and an effective dosage for a particular indication is within the level of skill in the art. Preferably for wound treatment, one administers the therapeutic  
15 compound directly to the site. Suitable dosage ranges for the polypeptides of the invention can be extrapolated from these dosages or from similar studies in appropriate animal models. Dosages can then be adjusted as necessary by the clinician to provide maximal therapeutic benefit.

#### 20 4.12.2 COMPOSITIONS/FORMULATIONS

Pharmaceutical compositions for use in accordance with the present invention thus may be formulated in a conventional manner using one or more physiologically acceptable carriers comprising excipients and auxiliaries which facilitate processing of the active compounds into preparations which can be used pharmaceutically. These  
25 pharmaceutical compositions may be manufactured in a manner that is itself known, *e.g.*, by means of conventional mixing, dissolving, granulating, dragee-making, levigating, emulsifying, encapsulating, entrapping or lyophilizing processes. Proper formulation is dependent upon the route of administration chosen. When a therapeutically effective amount of protein or other active ingredient of the present invention is administered  
30 orally, protein or other active ingredient of the present invention will be in the form of a tablet, capsule, powder, solution or elixir. When administered in tablet form, the

pharmaceutical composition of the invention may additionally contain a solid carrier such as a gelatin or an adjuvant. The tablet, capsule, and powder contain from about 5 to 95% protein or other active ingredient of the present invention, and preferably from about 25 to 90% protein or other active ingredient of the present invention. When administered in liquid form, a liquid carrier such as water, petroleum, oils of animal or plant origin such as peanut oil, mineral oil, soybean oil, or sesame oil, or synthetic oils may be added. The liquid form of the pharmaceutical composition may further contain physiological saline solution, dextrose or other saccharide solution, or glycols such as ethylene glycol, propylene glycol or polyethylene glycol. When administered in liquid form, the pharmaceutical composition contains from about 0.5 to 90% by weight of protein or other active ingredient of the present invention, and preferably from about 1 to 50% protein or other active ingredient of the present invention.

When a therapeutically effective amount of protein or other active ingredient of the present invention is administered by intravenous, cutaneous or subcutaneous injection, protein or other active ingredient of the present invention will be in the form of a pyrogen-free, parenterally acceptable aqueous solution. The preparation of such parenterally acceptable protein or other active ingredient solutions, having due regard to pH, isotonicity, stability, and the like, is within the skill in the art. A preferred pharmaceutical composition for intravenous, cutaneous, or subcutaneous injection should contain, in addition to protein or other active ingredient of the present invention, an isotonic vehicle such as Sodium Chloride Injection, Ringer's Injection, Dextrose Injection, Dextrose and Sodium Chloride Injection, Lactated Ringer's Injection, or other vehicle as known in the art. The pharmaceutical composition of the present invention may also contain stabilizers, preservatives, buffers, antioxidants, or other additives known to those of skill in the art. For injection, the agents of the invention may be formulated in aqueous solutions, preferably in physiologically compatible buffers such as Hanks's solution, Ringer's solution, or physiological saline buffer. For transmucosal administration, penetrants appropriate to the barrier to be permeated are used in the formulation. Such penetrants are generally known in the art.

For oral administration, the compounds can be formulated readily by combining the active compounds with pharmaceutically acceptable carriers well known in the art.

Such carriers enable the compounds of the invention to be formulated as tablets, pills, dragees, capsules, liquids, gels, syrups, slurries, suspensions and the like, for oral ingestion by a patient to be treated. Pharmaceutical preparations for oral use can be obtained from a solid excipient, optionally grinding a resulting mixture, and processing the mixture of granules, after adding suitable auxiliaries, if desired, to obtain tablets or dragee cores. Suitable excipients are, in particular, fillers such as sugars, including lactose, sucrose, mannitol, or sorbitol; cellulose preparations such as, for example, maize starch, wheat starch, rice starch, potato starch, gelatin, gum tragacanth, methyl cellulose, hydroxypropylmethyl-cellulose, sodium carboxymethylcellulose, and/or polyvinylpyrrolidone (PVP). If desired, disintegrating agents may be added, such as the cross-linked polyvinyl pyrrolidone, agar, or alginic acid or a salt thereof such as sodium alginate. Dragee cores are provided with suitable coatings. For this purpose, concentrated sugar solutions may be used, which may optionally contain gum arabic, talc, polyvinyl pyrrolidone, carbopol gel, polyethylene glycol, and/or titanium dioxide, lacquer solutions, and suitable organic solvents or solvent mixtures. Dyestuffs or pigments may be added to the tablets or dragee coatings for identification or to characterize different combinations of active compound doses.

Pharmaceutical preparations which can be used orally include push-fit capsules made of gelatin, as well as soft, sealed capsules made of gelatin and a plasticizer, such as glycerol or sorbitol. The push-fit capsules can contain the active ingredients in admixture with filler such as lactose, binders such as starches, and/or lubricants such as talc or magnesium stearate and, optionally, stabilizers. In soft capsules, the active compounds may be dissolved or suspended in suitable liquids, such as fatty oils, liquid paraffin, or liquid polyethylene glycols. In addition, stabilizers may be added. All formulations for oral administration should be in dosages suitable for such administration. For buccal administration, the compositions may take the form of tablets or lozenges formulated in conventional manner.

For administration by inhalation, the compounds for use according to the present invention are conveniently delivered in the form of an aerosol spray presentation from pressurized packs or a nebuliser, with the use of a suitable propellant, *e.g.*, dichlorodifluoromethane, trichlorofluoromethane, dichlorotetrafluoroethane, carbon

dioxide or other suitable gas. In the case of a pressurized aerosol the dosage unit may be determined by providing a valve to deliver a metered amount. Capsules and cartridges of, *e.g.*, gelatin for use in an inhaler or insufflator may be formulated containing a powder mix of the compound and a suitable powder base such as lactose or starch. The  
5 compounds may be formulated for parenteral administration by injection, *e.g.*, by bolus injection or continuous infusion. Formulations for injection may be presented in unit dosage form, *e.g.*, in ampules or in multi-dose containers, with an added preservative. The compositions may take such forms as suspensions, solutions or emulsions in oily or aqueous vehicles, and may contain formulatory agents such as suspending, stabilizing  
10 and/or dispersing agents.

Pharmaceutical formulations for parenteral administration include aqueous solutions of the active compounds in water-soluble form. Additionally, suspensions of the active compounds may be prepared as appropriate oily injection suspensions. Suitable lipophilic solvents or vehicles include fatty oils such as sesame oil, or synthetic  
15 fatty acid esters, such as ethyl oleate or triglycerides, or liposomes. Aqueous injection suspensions may contain substances which increase the viscosity of the suspension, such as sodium carboxymethyl cellulose, sorbitol, or dextran. Optionally, the suspension may also contain suitable stabilizers or agents which increase the solubility of the compounds to allow for the preparation of highly concentrated solutions. Alternatively, the active  
20 ingredient may be in powder form for constitution with a suitable vehicle, *e.g.*, sterile pyrogen-free water, before use.

The compounds may also be formulated in rectal compositions such as suppositories or retention enemas, *e.g.*, containing conventional suppository bases such as cocoa butter or other glycerides. In addition to the formulations described previously, the  
25 compounds may also be formulated as a depot preparation. Such long acting formulations may be administered by implantation (for example subcutaneously or intramuscularly) or by intramuscular injection. Thus, for example, the compounds may be formulated with suitable polymeric or hydrophobic materials (for example as an emulsion in an acceptable oil) or ion exchange resins, or as sparingly soluble derivatives,  
30 for example, as a sparingly soluble salt.

A pharmaceutical carrier for the hydrophobic compounds of the invention is a co-solvent system comprising benzyl alcohol, a nonpolar surfactant, a water-miscible organic polymer, and an aqueous phase. The co-solvent system may be the VPD co-solvent system. VPD is a solution of 3% w/v benzyl alcohol, 8% w/v of the nonpolar surfactant polysorbate 80, and 65% w/v polyethylene glycol 300, made up to volume in absolute ethanol. The VPD co-solvent system (VPD:5W) consists of VPD diluted 1:1 with a 5% dextrose in water solution. This co-solvent system dissolves hydrophobic compounds well, and itself produces low toxicity upon systemic administration. Naturally, the proportions of a co-solvent system may be varied considerably without destroying its solubility and toxicity characteristics. Furthermore, the identity of the co-solvent components may be varied: for example, other low-toxicity nonpolar surfactants may be used instead of polysorbate 80; the fraction size of polyethylene glycol may be varied; other biocompatible polymers may replace polyethylene glycol, e.g. polyvinyl pyrrolidone; and other sugars or polysaccharides may substitute for dextrose. Alternatively, other delivery systems for hydrophobic pharmaceutical compounds may be employed. Liposomes and emulsions are well known examples of delivery vehicles or carriers for hydrophobic drugs. Certain organic solvents such as dimethylsulfoxide also may be employed, although usually at the cost of greater toxicity. Additionally, the compounds may be delivered using a sustained-release system, such as semipermeable matrices of solid hydrophobic polymers containing the therapeutic agent. Various types of sustained-release materials have been established and are well known by those skilled in the art. Sustained-release capsules may, depending on their chemical nature, release the compounds for a few weeks up to over 100 days. Depending on the chemical nature and the biological stability of the therapeutic reagent, additional strategies for protein or other active ingredient stabilization may be employed.

The pharmaceutical compositions also may comprise suitable solid or gel phase carriers or excipients. Examples of such carriers or excipients include but are not limited to calcium carbonate, calcium phosphate, various sugars, starches, cellulose derivatives, gelatin, and polymers such as polyethylene glycols. Many of the active ingredients of the invention may be provided as salts with pharmaceutically compatible counter ions. Such pharmaceutically acceptable base addition salts are those salts which retain the biological



effectiveness and properties of the free acids and which are obtained by reaction with inorganic or organic bases such as sodium hydroxide, magnesium hydroxide, ammonia, trialkylamine, dialkylamine, monoalkylamine, dibasic amino acids, sodium acetate, potassium benzoate, triethanol amine and the like.

5           The pharmaceutical composition of the invention may be in the form of a complex of the protein(s) or other active ingredient(s) of present invention along with protein or peptide antigens. The protein and/or peptide antigen will deliver a stimulatory signal to both B and T lymphocytes. B lymphocytes will respond to antigen through their surface immunoglobulin receptor. T lymphocytes will respond to antigen through the T  
10 cell receptor (TCR) following presentation of the antigen by MHC proteins. MHC and structurally related proteins including those encoded by class I and class II MHC genes on host cells will serve to present the peptide antigen(s) to T lymphocytes. The antigen components could also be supplied as purified MHC-peptide complexes alone or with co-stimulatory molecules that can directly signal T cells. Alternatively antibodies able to  
15 bind surface immunoglobulin and other molecules on B cells as well as antibodies able to bind the TCR and other molecules on T cells can be combined with the pharmaceutical composition of the invention.

          The pharmaceutical composition of the invention may be in the form of a liposome in which protein of the present invention is combined, in addition to other  
20 pharmaceutically acceptable carriers, with amphipathic agents such as lipids which exist in aggregated form as micelles, insoluble monolayers, liquid crystals, or lamellar layers in aqueous solution. Suitable lipids for liposomal formulation include, without limitation, monoglycerides, diglycerides, sulfatides, lysolecithins, phospholipids, saponin, bile acids, and the like. Preparation of such liposomal formulations is within the level of skill in the  
25 art, as disclosed, for example, in U.S. Patent Nos. 4,235,871; 4,501,728; 4,837,028; and 4,737,323, all of which are incorporated herein by reference.

          The amount of protein or other active ingredient of the present invention in the pharmaceutical composition of the present invention will depend upon the nature and severity of the condition being treated, and on the nature of prior treatments which the  
30 patient has undergone. Ultimately, the attending physician will decide the amount of protein or other active ingredient of the present invention with which to treat each

individual patient. Initially, the attending physician will administer low doses of protein or other active ingredient of the present invention and observe the patient's response. Larger doses of protein or other active ingredient of the present invention may be administered until the optimal therapeutic effect is obtained for the patient, and at that point the dosage is not increased further. It is contemplated that the various pharmaceutical compositions used to practice the method of the present invention should contain about 0.01  $\mu$ g to about 100 mg (preferably about 0.1  $\mu$ g to about 10 mg, more preferably about 0.1  $\mu$ g to about 1 mg) of protein or other active ingredient of the present invention per kg body weight. For compositions of the present invention which are useful for bone, cartilage, tendon or ligament regeneration, the therapeutic method includes administering the composition topically, systemically, or locally as an implant or device. When administered, the therapeutic composition for use in this invention is, of course, in a pyrogen-free, physiologically acceptable form. Further, the composition may desirably be encapsulated or injected in a viscous form for delivery to the site of bone, cartilage or tissue damage. Topical administration may be suitable for wound healing and tissue repair. Therapeutically useful agents other than a protein or other active ingredient of the invention which may also optionally be included in the composition as described above, may alternatively or additionally, be administered simultaneously or sequentially with the composition in the methods of the invention. Preferably for bone and/or cartilage formation, the composition would include a matrix capable of delivering the protein-containing or other active ingredient-containing composition to the site of bone and/or cartilage damage, providing a structure for the developing bone and cartilage and optimally capable of being resorbed into the body. Such matrices may be formed of materials presently in use for other implanted medical applications.

The choice of matrix material is based on biocompatibility, biodegradability, mechanical properties, cosmetic appearance and interface properties. The particular application of the compositions will define the appropriate formulation. Potential matrices for the compositions may be biodegradable and chemically defined calcium sulfate, tricalcium phosphate, hydroxyapatite, polylactic acid, polyglycolic acid and polyanhydrides. Other potential materials are biodegradable and biologically well-defined, such as bone or dermal collagen. Further matrices are comprised of pure

proteins or extracellular matrix components. Other potential matrices are nonbiodegradable and chemically defined, such as sintered hydroxyapatite, bioglass, aluminates, or other ceramics. Matrices may be comprised of combinations of any of the above mentioned types of material, such as polylactic acid and hydroxyapatite or collagen and tricalcium phosphate. The bioceramics may be altered in composition, such as in calcium-aluminate-phosphate and processing to alter pore size, particle size, particle shape, and biodegradability. Presently preferred is a 50:50 (mole weight) copolymer of lactic acid and glycolic acid in the form of porous particles having diameters ranging from 150 to 800 microns. In some applications, it will be useful to utilize a sequestering agent, such as carboxymethyl cellulose or autologous blood clot, to prevent the protein compositions from disassociating from the matrix.

A preferred family of sequestering agents is cellulosic materials such as alkylcelluloses (including hydroxyalkylcelluloses), including methylcellulose, ethylcellulose, hydroxyethylcellulose, hydroxypropylcellulose, hydroxypropyl-methylcellulose, and carboxymethylcellulose, the most preferred being cationic salts of carboxymethylcellulose (CMC). Other preferred sequestering agents include hyaluronic acid, sodium alginate, poly(ethylene glycol), polyoxyethylene oxide, carboxyvinyl polymer and poly(vinyl alcohol). The amount of sequestering agent useful herein is 0.5-20 wt %, preferably 1-10 wt % based on total formulation weight, which represents the amount necessary to prevent desorption of the protein from the polymer matrix and to provide appropriate handling of the composition, yet not so much that the progenitor cells are prevented from infiltrating the matrix, thereby providing the protein the opportunity to assist the osteogenic activity of the progenitor cells. In further compositions, proteins or other active ingredients of the invention may be combined with other agents beneficial to the treatment of the bone and/or cartilage defect, wound, or tissue in question. These agents include various growth factors such as epidermal growth factor (EGF), platelet derived growth factor (PDGF), transforming growth factors (TGF- $\alpha$  and TGF- $\beta$ ), and insulin-like growth factor (IGF).

The therapeutic compositions are also presently valuable for veterinary applications. Particularly domestic animals and thoroughbred horses, in addition to humans, are desired patients for such treatment with proteins or other active ingredients

of the present invention. The dosage regimen of a protein-containing pharmaceutical composition to be used in tissue regeneration will be determined by the attending physician considering various factors which modify the action of the proteins, *e.g.*, amount of tissue weight desired to be formed, the site of damage, the condition of the damaged tissue, the size of a wound, type of damaged tissue (*e.g.*, bone), the patient's age, sex, and diet, the severity of any infection, time of administration and other clinical factors. The dosage may vary with the type of matrix used in the reconstitution and with inclusion of other proteins in the pharmaceutical composition. For example, the addition of other known growth factors, such as IGF I (insulin like growth factor I), to the final composition, may also effect the dosage. Progress can be monitored by periodic assessment of tissue/bone growth and/or repair, for example, X-rays, histomorphometric determinations and tetracycline labeling.

Polynucleotides of the present invention can also be used for gene therapy. Such polynucleotides can be introduced either *in vivo* or *ex vivo* into cells for expression in a mammalian subject. Polynucleotides of the invention may also be administered by other known methods for introduction of nucleic acid into a cell or organism (including, without limitation, in the form of viral vectors or naked DNA). Cells may also be cultured *ex vivo* in the presence of proteins of the present invention in order to proliferate or to produce a desired effect on or activity in such cells. Treated cells can then be introduced *in vivo* for therapeutic purposes.

#### 4.12.3 EFFECTIVE DOSAGE

Pharmaceutical compositions suitable for use in the present invention include compositions wherein the active ingredients are contained in an effective amount to achieve its intended purpose. More specifically, a therapeutically effective amount means an amount effective to prevent development of or to alleviate the existing symptoms of the subject being treated. Determination of the effective amount is well within the capability of those skilled in the art, especially in light of the detailed disclosure provided herein. For any compound used in the method of the invention, the therapeutically effective dose can be estimated initially from appropriate *in vitro* assays. For example, a dose can be formulated in animal models to achieve a circulating

concentration range that can be used to more accurately determine useful doses in humans. For example, a dose can be formulated in animal models to achieve a circulating concentration range that includes the  $IC_{50}$  as determined in cell culture (*i.e.*, the concentration of the test compound which achieves a half-maximal inhibition of the protein's biological activity). Such information can be used to more accurately determine useful doses in humans.

A therapeutically effective dose refers to that amount of the compound that results in amelioration of symptoms or a prolongation of survival in a patient. Toxicity and therapeutic efficacy of such compounds can be determined by standard pharmaceutical procedures in cell cultures or experimental animals, *e.g.*, for determining the  $LD_{50}$  (the dose lethal to 50% of the population) and the  $ED_{50}$  (the dose therapeutically effective in 50% of the population). The dose ratio between toxic and therapeutic effects is the therapeutic index and it can be expressed as the ratio between  $LD_{50}$  and  $ED_{50}$ . Compounds which exhibit high therapeutic indices are preferred. The data obtained from these cell culture assays and animal studies can be used in formulating a range of dosage for use in human. The dosage of such compounds lies preferably within a range of circulating concentrations that include the  $ED_{50}$  with little or no toxicity. The dosage may vary within this range depending upon the dosage form employed and the route of administration utilized. The exact formulation, route of administration and dosage can be chosen by the individual physician in view of the patient's condition. See, *e.g.*, Fingl et al., 1975, in "The Pharmacological Basis of Therapeutics", Ch. 1 p.1. Dosage amount and interval may be adjusted individually to provide plasma levels of the active moiety which are sufficient to maintain the desired effects, or minimal effective concentration (MEC). The MEC will vary for each compound but can be estimated from *in vitro* data. Dosages necessary to achieve the MEC will depend on individual characteristics and route of administration. However, HPLC assays or bioassays can be used to determine plasma concentrations.

Dosage intervals can also be determined using MEC value. Compounds should be administered using a regimen which maintains plasma levels above the MEC for 10-90% of the time, preferably between 30-90% and most preferably between 50-90%.

In cases of local administration or selective uptake, the effective local concentration of the drug may not be related to plasma concentration.

An exemplary dosage regimen for polypeptides or other compositions of the invention will be in the range of about 0.01 µg/kg to 100 mg/kg of body weight daily, with the preferred dose being about 0.1 µg/kg to 25 mg/kg of patient body weight daily, varying in adults and children. Dosing may be once daily, or equivalent doses may be delivered at longer or shorter intervals.

The amount of composition administered will, of course, be dependent on the subject being treated, on the subject's age and weight, the severity of the affliction, the manner of administration and the judgment of the prescribing physician.

#### 4.12.4 PACKAGING

The compositions may, if desired, be presented in a pack or dispenser device which may contain one or more unit dosage forms containing the active ingredient. The pack may, for example, comprise metal or plastic foil, such as a blister pack. The pack or dispenser device may be accompanied by instructions for administration. Compositions comprising a compound of the invention formulated in a compatible pharmaceutical carrier may also be prepared, placed in an appropriate container, and labeled for treatment of an indicated condition.

#### 4.13 ANTIBODIES

Also included in the invention are antibodies to proteins, or fragments of proteins of the invention. The term "antibody" as used herein refers to immunoglobulin molecules and immunologically active portions of immunoglobulin (Ig) molecules, i.e., molecules that contain an antigen binding site that specifically binds (immunoreacts with) an antigen. Such antibodies include, but are not limited to, polyclonal, monoclonal, chimeric, single chain, F<sub>ab</sub>, F<sub>ab</sub>' and F<sub>(ab)2</sub> fragments, and an F<sub>ab</sub> expression library. In general, an antibody molecule obtained from humans relates to any of the classes IgG, IgM, IgA, IgE and IgD, which differ from one another by the nature of the heavy chain present in the molecule. Certain classes have subclasses as well, such as IgG<sub>1</sub>, IgG<sub>2</sub>, and others. Furthermore, in humans, the light chain may be a kappa chain or a lambda chain.

Reference herein to antibodies includes a reference to all such classes, subclasses and types of human antibody species.

An isolated related protein of the invention may be intended to serve as an antigen, or a portion or fragment thereof, and additionally can be used as an immunogen to generate antibodies that immunospecifically bind the antigen, using standard techniques for polyclonal and monoclonal antibody preparation. The full-length protein can be used or, alternatively, the invention provides antigenic peptide fragments of the antigen for use as immunogens. An antigenic peptide fragment comprises at least 6 amino acid residues of the amino acid sequence of the full length protein, such as an amino acid sequence shown in SEQ ID NO: 4, and encompasses an epitope thereof such that an antibody raised against the peptide forms a specific immune complex with the full length protein or with any fragment that contains the epitope. Preferably, the antigenic peptide comprises at least 10 amino acid residues, or at least 15 amino acid residues, or at least 20 amino acid residues, or at least 30 amino acid residues. Preferred epitopes encompassed by the antigenic peptide are regions of the protein that are located on its surface; commonly these are hydrophilic regions.

In certain embodiments of the invention, at least one epitope encompassed by the antigenic peptide is a region of related protein that is located on the surface of the protein, *e.g.*, a hydrophilic region. A hydrophobicity analysis of the human related protein sequence will indicate which regions of a related protein are particularly hydrophilic and, therefore, are likely to encode surface residues useful for targeting antibody production. As a means for targeting antibody production, hydropathy plots showing regions of hydrophilicity and hydrophobicity may be generated by any method well known in the art, including, for example, the Kyte Doolittle or the Hopp Woods methods, either with or without Fourier transformation. See, *e.g.*, Hopp and Woods, 1981, *Proc. Nat. Acad. Sci. USA* 78: 3824-3828; Kyte and Doolittle 1982, *J. Mol. Biol.* 157: 105-142, each of which is incorporated herein by reference in its entirety. Antibodies that are specific for one or more domains within an antigenic protein, or derivatives, fragments, analogs or homologs thereof, are also provided herein.

A protein of the invention, or a derivative, fragment, analog, homolog or ortholog thereof, may be utilized as an immunogen in the generation of antibodies that immunospecifically bind these protein components.

Various procedures known within the art may be used for the production of polyclonal or monoclonal antibodies directed against a protein of the invention, or against derivatives, fragments, analogs homologs or orthologs thereof (see, for example, Antibodies: A Laboratory Manual, Harlow E, and Lane D, 1988, Cold Spring Harbor Laboratory Press, Cold Spring Harbor, NY, incorporated herein by reference). Some of these antibodies are discussed below.

#### 5.13.1 Polyclonal Antibodies

For the production of polyclonal antibodies, various suitable host animals (e.g., rabbit, goat, mouse or other mammal) may be immunized by one or more injections with the native protein, a synthetic variant thereof, or a derivative of the foregoing. An appropriate immunogenic preparation can contain, for example, the naturally occurring immunogenic protein, a chemically synthesized polypeptide representing the immunogenic protein, or a recombinantly expressed immunogenic protein. Furthermore, the protein may be conjugated to a second protein known to be immunogenic in the mammal being immunized. Examples of such immunogenic proteins include but are not limited to keyhole limpet hemocyanin, serum albumin, bovine thyroglobulin, and soybean trypsin inhibitor. The preparation can further include an adjuvant. Various adjuvants used to increase the immunological response include, but are not limited to, Freund's (complete and incomplete), mineral gels (e.g., aluminum hydroxide), surface active substances (e.g., lysolecithin, pluronic polyols, polyanions, peptides, oil emulsions, dinitrophenol, etc.), adjuvants usable in humans such as Bacille Calmette-Guerin and *Corynebacterium parvum*, or similar immunostimulatory agents. Additional examples of adjuvants which can be employed include MPL-TDM adjuvant (monophosphoryl Lipid A, synthetic trehalose dicorynomycolate).

The polyclonal antibody molecules directed against the immunogenic protein can be isolated from the mammal (e.g., from the blood) and further purified by well known techniques, such as affinity chromatography using protein A or protein G, which provide



primarily the IgG fraction of immune serum. Subsequently, or alternatively, the specific antigen which is the target of the immunoglobulin sought, or an epitope thereof, may be immobilized on a column to purify the immune specific antibody by immunoaffinity chromatography. Purification of immunoglobulins is discussed, for example, by D.

- 5 Wilkinson (The Scientist, published by The Scientist, Inc., Philadelphia PA, Vol. 14, No. 8 (April 17, 2000), pp. 25-28).

### 5.13.2 Monoclonal Antibodies

- The term "monoclonal antibody" (MAb) or "monoclonal antibody composition",  
10 as used herein, refers to a population of antibody molecules that contain only one molecular species of antibody molecule consisting of a unique light chain gene product and a unique heavy chain gene product. In particular, the complementarity determining regions (CDRs) of the monoclonal antibody are identical in all the molecules of the population. MAbs thus contain an antigen binding site capable of immunoreacting with a  
15 particular epitope of the antigen characterized by a unique binding affinity for it.

- Monoclonal antibodies can be prepared using hybridoma methods, such as those described by Kohler and Milstein, Nature, 256:495 (1975). In a hybridoma method, a mouse, hamster, or other appropriate host animal, is typically immunized with an immunizing agent to elicit lymphocytes that produce or are capable of producing  
20 antibodies that will specifically bind to the immunizing agent. Alternatively, the lymphocytes can be immunized in vitro.

- The immunizing agent will typically include the protein antigen, a fragment thereof or a fusion protein thereof. Generally, either peripheral blood lymphocytes are used if cells of human origin are desired, or spleen cells or lymph node cells are used if non-human  
25 mammalian sources are desired. The lymphocytes are then fused with an immortalized cell line using a suitable fusing agent, such as polyethylene glycol, to form a hybridoma cell (Goding, Monoclonal Antibodies: Principles and Practice, Academic Press, (1986) pp. 59-103). Immortalized cell lines are usually transformed mammalian cells, particularly myeloma cells of rodent, bovine and human origin. Usually, rat or mouse  
30 myeloma cell lines are employed. The hybridoma cells can be cultured in a suitable culture medium that preferably contains one or more substances that inhibit the growth or

survival of the unfused, immortalized cells. For example, if the parental cells lack the enzyme hypoxanthine guanine phosphoribosyl transferase (HGPRT or HPRT), the culture medium for the hybridomas typically will include hypoxanthine, aminopterin, and thymidine ("HAT medium"), which substances prevent the growth of HGPRT-deficient cells.

Preferred immortalized cell lines are those that fuse efficiently, support stable high level expression of antibody by the selected antibody-producing cells, and are sensitive to a medium such as HAT medium. More preferred immortalized cell lines are murine myeloma lines, which can be obtained, for instance, from the Salk Institute Cell Distribution Center, San Diego, California and the American Type Culture Collection, Manassas, Virginia. Human myeloma and mouse-human heteromyeloma cell lines also have been described for the production of human monoclonal antibodies (Kozbor, J. Immunol., 133:3001 (1984); Brodeur et al., Monoclonal Antibody Production Techniques and Applications, Marcel Dekker, Inc., New York, (1987) pp. 51-63).

The culture medium in which the hybridoma cells are cultured can then be assayed for the presence of monoclonal antibodies directed against the antigen. Preferably, the binding specificity of monoclonal antibodies produced by the hybridoma cells is determined by immunoprecipitation or by an in vitro binding assay, such as radioimmunoassay (RIA) or enzyme-linked immunoabsorbent assay (ELISA). Such techniques and assays are known in the art. The binding affinity of the monoclonal antibody can, for example, be determined by the Scatchard analysis of Munson and Pollard, Anal. Biochem., 107:220 (1980). Preferably, antibodies having a high degree of specificity and a high binding affinity for the target antigen are isolated.

After the desired hybridoma cells are identified, the clones can be subcloned by limiting dilution procedures and grown by standard methods. Suitable culture media for this purpose include, for example, Dulbecco's Modified Eagle's Medium and RPMI-1640 medium. Alternatively, the hybridoma cells can be grown in vivo as ascites in a mammal.

The monoclonal antibodies secreted by the subclones can be isolated or purified from the culture medium or ascites fluid by conventional immunoglobulin purification procedures

such as, for example, protein A-Sepharose, hydroxylapatite chromatography, gel electrophoresis, dialysis, or affinity chromatography.

The monoclonal antibodies can also be made by recombinant DNA methods, such as those described in U.S. Patent No. 4,816,567. DNA encoding the monoclonal antibodies of the invention can be readily isolated and sequenced using conventional procedures (e.g., by using oligonucleotide probes that are capable of binding specifically to genes encoding the heavy and light chains of murine antibodies). The hybridoma cells of the invention serve as a preferred source of such DNA. Once isolated, the DNA can be placed into expression vectors, which are then transfected into host cells such as simian COS cells, Chinese hamster ovary (CHO) cells, or myeloma cells that do not otherwise produce immunoglobulin protein, to obtain the synthesis of monoclonal antibodies in the recombinant host cells. The DNA also can be modified, for example, by substituting the coding sequence for human heavy and light chain constant domains in place of the homologous murine sequences (U.S. Patent No. 4,816,567; Morrison, Nature 368, 812-13 (1994)) or by covalently joining to the immunoglobulin coding sequence all or part of the coding sequence for a non-immunoglobulin polypeptide. Such a non-immunoglobulin polypeptide can be substituted for the constant domains of an antibody of the invention, or can be substituted for the variable domains of one antigen-combining site of an antibody of the invention to create a chimeric bivalent antibody.

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### 5.13.2 Humanized Antibodies

The antibodies directed against the protein antigens of the invention can further comprise humanized antibodies or human antibodies. These antibodies are suitable for administration to humans without engendering an immune response by the human against the administered immunoglobulin. Humanized forms of antibodies are chimeric immunoglobulins, immunoglobulin chains or fragments thereof (such as Fv, Fab, Fab', F(ab')<sub>2</sub> or other antigen-binding subsequences of antibodies) that are principally comprised of the sequence of a human immunoglobulin, and contain minimal sequence derived from a non-human immunoglobulin. Humanization can be performed following the method of Winter and co-workers (Jones et al., Nature, 321:522-525 (1986); Riechmann et al., Nature, 332:323-327 (1988); Verhoeyen et al., Science, 239:1534-1536

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(1988)), by substituting rodent CDRs or CDR sequences for the corresponding sequences of a human antibody. (See also U.S. Patent No. 5,225,539.) In some instances, Fv framework residues of the human immunoglobulin are replaced by corresponding non-human residues. Humanized antibodies can also comprise residues which are found  
5 neither in the recipient antibody nor in the imported CDR or framework sequences. In general, the humanized antibody will comprise substantially all of at least one, and typically two, variable domains, in which all or substantially all of the CDR regions correspond to those of a non-human immunoglobulin and all or substantially all of the framework regions are those of a human immunoglobulin consensus sequence. The  
10 humanized antibody optimally also will comprise at least a portion of an immunoglobulin constant region (Fc), typically that of a human immunoglobulin (Jones et al., 1986; Riechmann et al., 1988; and Presta, Curr. Op. Struct. Biol., 2:593-596 (1992)).

### 5.13.3 Human Antibodies

15 Fully human antibodies relate to antibody molecules in which essentially the entire sequences of both the light chain and the heavy chain, including the CDRs, arise from human genes. Such antibodies are termed "human antibodies", or "fully human antibodies" herein. Human monoclonal antibodies can be prepared by the trioma technique; the human B-cell hybridoma technique (see Kozbor, et al., 1983 Immunol  
20 Today 4: 72) and the EBV hybridoma technique to produce human monoclonal antibodies (see Cole, et al., 1985 In: MONOCLONAL ANTIBODIES AND CANCER THERAPY, Alan R. Liss, Inc., pp. 77-96). Human monoclonal antibodies may be utilized in the practice of the present invention and may be produced by using human hybridomas (see Cote, et al., 1983. Proc Natl Acad Sci USA 80: 2026-2030) or by transforming human  
25 B-cells with Epstein Barr Virus in vitro (see Cole, et al., 1985 In: MONOCLONAL ANTIBODIES AND CANCER THERAPY, Alan R. Liss, Inc., pp. 77-96).

In addition, human antibodies can also be produced using additional techniques, including phage display libraries (Hoogenboom and Winter, J. Mol. Biol., 227:381 (1991); Marks et al., J. Mol. Biol., 222:581 (1991)). Similarly, human antibodies can be  
30 made by introducing human immunoglobulin loci into transgenic animals, e.g., mice in which the endogenous immunoglobulin genes have been partially or completely

inactivated. Upon challenge, human antibody production is observed, which closely resembles that seen in humans in all respects, including gene rearrangement, assembly, and antibody repertoire. This approach is described, for example, in U.S. Patent Nos. 5,545,807; 5,545,806; 5,569,825; 5,625,126; 5,633,425; 5,661,016, and in Marks et al. (Bio/Technology 10, 779-783 (1992)); Lonberg et al. (Nature 368 856-859 (1994)); Morrison (Nature 368, 812-13 (1994)); Fishwild et al. (Nature Biotechnology 14, 845-51 (1996)); Neuberger (Nature Biotechnology 14, 826 (1996)); and Lonberg and Huszar (Intern. Rev. Immunol. 13 65-93 (1995)).

Human antibodies may additionally be produced using transgenic nonhuman animals which are modified so as to produce fully human antibodies rather than the animal's endogenous antibodies in response to challenge by an antigen. (See PCT publication WO94/02602). The endogenous genes encoding the heavy and light immunoglobulin chains in the nonhuman host have been incapacitated, and active loci encoding human heavy and light chain immunoglobulins are inserted into the host's genome. The human genes are incorporated, for example, using yeast artificial chromosomes containing the requisite human DNA segments. An animal which provides all the desired modifications is then obtained as progeny by crossbreeding intermediate transgenic animals containing fewer than the full complement of the modifications. The preferred embodiment of such a nonhuman animal is a mouse, and is termed the Xenomouse<sup>TM</sup> as disclosed in PCT publications WO 96/33735 and WO 96/34096. This animal produces B cells which secrete fully human immunoglobulins. The antibodies can be obtained directly from the animal after immunization with an immunogen of interest, as, for example, a preparation of a polyclonal antibody, or alternatively from immortalized B cells derived from the animal, such as hybridomas producing monoclonal antibodies. Additionally, the genes encoding the immunoglobulins with human variable regions can be recovered and expressed to obtain the antibodies directly, or can be further modified to obtain analogs of antibodies such as, for example, single chain Fv molecules.

An example of a method of producing a nonhuman host, exemplified as a mouse, lacking expression of an endogenous immunoglobulin heavy chain is disclosed in U.S. Patent No. 5,939,598. It can be obtained by a method including deleting the J segment genes from at least one endogenous heavy chain locus in an embryonic stem cell to

prevent rearrangement of the locus and to prevent formation of a transcript of a rearranged immunoglobulin heavy chain locus, the deletion being effected by a targeting vector containing a gene encoding a selectable marker; and producing from the embryonic stem cell a transgenic mouse whose somatic and germ cells contain the gene  
5 encoding the selectable marker.

A method for producing an antibody of interest, such as a human antibody, is disclosed in U.S. Patent No. 5,916,771. It includes introducing an expression vector that contains a nucleotide sequence encoding a heavy chain into one mammalian host cell in culture, introducing an expression vector containing a nucleotide sequence encoding a  
10 light chain into another mammalian host cell, and fusing the two cells to form a hybrid cell. The hybrid cell expresses an antibody containing the heavy chain and the light chain.

In a further improvement on this procedure, a method for identifying a clinically relevant epitope on an immunogen, and a correlative method for selecting an antibody  
15 that binds immunospecifically to the relevant epitope with high affinity, are disclosed in PCT publication WO 99/53049.

#### **5.13.4 F<sub>ab</sub> Fragments and Single Chain Antibodies**

According to the invention, techniques can be adapted for the production of  
20 single-chain antibodies specific to an antigenic protein of the invention (see e.g., U.S. Patent No. 4,946,778). In addition, methods can be adapted for the construction of F<sub>ab</sub> expression libraries (see e.g., Huse, et al., 1989 Science 246: 1275-1281) to allow rapid and effective identification of monoclonal F<sub>ab</sub> fragments with the desired specificity for a protein or derivatives, fragments, analogs or homologs thereof. Antibody fragments that  
25 contain the idiotypes to a protein antigen may be produced by techniques known in the art including, but not limited to: (i) an F<sub>(ab')<sub>2</sub></sub> fragment produced by pepsin digestion of an antibody molecule; (ii) an F<sub>ab</sub> fragment generated by reducing the disulfide bridges of an F<sub>(ab')<sub>2</sub></sub> fragment; (iii) an F<sub>ab</sub> fragment generated by the treatment of the antibody molecule with papain and a reducing agent and (iv) F<sub>v</sub> fragments.

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#### **5.13.5 Bispecific Antibodies**

Bispecific antibodies are monoclonal, preferably human or humanized, antibodies that have binding specificities for at least two different antigens. In the present case, one of the binding specificities is for an antigenic protein of the invention. The second binding target is any other antigen, and advantageously is a cell-surface protein or receptor or receptor subunit.

Methods for making bispecific antibodies are known in the art. Traditionally, the recombinant production of bispecific antibodies is based on the co-expression of two immunoglobulin heavy-chain/light-chain pairs, where the two heavy chains have different specificities (Milstein and Cuello, Nature, 305:537-539 (1983)). Because of the random assortment of immunoglobulin heavy and light chains, these hybridomas (quadromas) produce a potential mixture of ten different antibody molecules, of which only one has the correct bispecific structure. The purification of the correct molecule is usually accomplished by affinity chromatography steps. Similar procedures are disclosed in WO 93/08829, published 13 May 1993, and in Traunecker *et al.*, 1991 *EMBO J.*, 10:3655-3659.

Antibody variable domains with the desired binding specificities (antibody-antigen combining sites) can be fused to immunoglobulin constant domain sequences. The fusion preferably is with an immunoglobulin heavy-chain constant domain, comprising at least part of the hinge, CH2, and CH3 regions. It is preferred to have the first heavy-chain constant region (CH1) containing the site necessary for light-chain binding present in at least one of the fusions. DNAs encoding the immunoglobulin heavy-chain fusions and, if desired, the immunoglobulin light chain, are inserted into separate expression vectors, and are co-transfected into a suitable host organism. For further details of generating bispecific antibodies see, for example, Suresh *et al.*, Methods in Enzymology, 121:210 (1986).

According to another approach described in WO 96/27011, the interface between a pair of antibody molecules can be engineered to maximize the percentage of heterodimers which are recovered from recombinant cell culture. The preferred interface comprises at least a part of the CH3 region of an antibody constant domain. In this method, one or more small amino acid side chains from the interface of the first antibody molecule are replaced with larger side chains (e.g. tyrosine or tryptophan).

Compensatory "cavities" of identical or similar size to the large side chain(s) are created on the interface of the second antibody molecule by replacing large amino acid side chains with smaller ones (e.g. alanine or threonine). This provides a mechanism for increasing the yield of the heterodimer over other unwanted end-products such as homodimers.

Bispecific antibodies can be prepared as full length antibodies or antibody fragments (e.g.  $F(ab')_2$  bispecific antibodies). Techniques for generating bispecific antibodies from antibody fragments have been described in the literature. For example, bispecific antibodies can be prepared using chemical linkage. Brennan et al., Science 10 229:81 (1985) describe a procedure wherein intact antibodies are proteolytically cleaved to generate  $F(ab')_2$  fragments. These fragments are reduced in the presence of the dithiol complexing agent sodium arsenite to stabilize vicinal dithiols and prevent intermolecular disulfide formation. The  $Fab'$  fragments generated are then converted to thionitrobenzoate (TNB) derivatives. One of the  $Fab'$ -TNB derivatives is then 15 reconverted to the  $Fab'$ -thiol by reduction with mercaptoethylamine and is mixed with an equimolar amount of the other  $Fab'$ -TNB derivative to form the bispecific antibody. The bispecific antibodies produced can be used as agents for the selective immobilization of enzymes.

Additionally,  $Fab'$  fragments can be directly recovered from *E. coli* and 20 chemically coupled to form bispecific antibodies. Shalaby et al., J. Exp. Med. 175:217-225 (1992) describe the production of a fully humanized bispecific antibody  $F(ab')_2$  molecule. Each  $Fab'$  fragment was separately secreted from *E. coli* and subjected to directed chemical coupling in vitro to form the bispecific antibody. The bispecific antibody thus formed was able to bind to cells overexpressing the ErbB2 receptor and 25 normal human T cells, as well as trigger the lytic activity of human cytotoxic lymphocytes against human breast tumor targets.

Various techniques for making and isolating bispecific antibody fragments directly from recombinant cell culture have also been described. For example, bispecific antibodies have been produced using leucine zippers. Kostelny et al., J. Immunol. 30 148(5):1547-1553 (1992). The leucine zipper peptides from the Fos and Jun proteins were linked to the  $Fab'$  portions of two different antibodies by gene fusion. The antibody



homodimers were reduced at the hinge region to form monomers and then re-oxidized to form the antibody heterodimers. This method can also be utilized for the production of antibody homodimers. The "diabody" technology described by Hollinger et al., Proc. Natl. Acad. Sci. USA 90:6444-6448 (1993) has provided an alternative mechanism for making bispecific antibody fragments. The fragments comprise a heavy-chain variable domain ( $V_H$ ) connected to a light-chain variable domain ( $V_L$ ) by a linker which is too short to allow pairing between the two domains on the same chain. Accordingly, the  $V_H$  and  $V_L$  domains of one fragment are forced to pair with the complementary  $V_L$  and  $V_H$  domains of another fragment, thereby forming two antigen-binding sites. Another strategy for making bispecific antibody fragments by the use of single-chain Fv (sFv) dimers has also been reported. See, Gruber et al., J. Immunol. 152:5368 (1994).

Antibodies with more than two valencies are contemplated. For example, trispecific antibodies can be prepared. Tutt et al., J. Immunol. 147:60 (1991). Exemplary bispecific antibodies can bind to two different epitopes, at least one of which originates in the protein antigen of the invention. Alternatively, an anti-antigenic arm of an immunoglobulin molecule can be combined with an arm which binds to a triggering molecule on a leukocyte such as a T-cell receptor molecule (e.g. CD2, CD3, CD28, or B7), or Fc receptors for IgG (FcγR), such as FcγRI (CD64), FcγRII (CD32) and FcγRIII (CD16) so as to focus cellular defense mechanisms to the cell expressing the particular antigen. Bispecific antibodies can also be used to direct cytotoxic agents to cells which express a particular antigen. These antibodies possess an antigen-binding arm and an arm which binds a cytotoxic agent or a radionuclide chelator, such as EOTUBE, DPTA, DOTA, or TETA. Another bispecific antibody of interest binds the protein antigen described herein and further binds tissue factor (TF).

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### 5.13.6 Heteroconjugate Antibodies

Heteroconjugate antibodies are also within the scope of the present invention. Heteroconjugate antibodies are composed of two covalently joined antibodies. Such antibodies have, for example, been proposed to target immune system cells to unwanted cells (U.S. Patent No. 4,676,980), and for treatment of HIV infection (WO 91/00360; WO 92/200373; EP 03089). It is contemplated that the antibodies can be prepared in

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vitro using known methods in synthetic protein chemistry, including those involving crosslinking agents. For example, immunotoxins can be constructed using a disulfide exchange reaction or by forming a thioether bond. Examples of suitable reagents for this purpose include iminothiolate and methyl-4-mercaptobutyrimidate and those disclosed,  
5 for example, in U.S. Patent No. 4,676,980.

### 5.13.7 Effector Function Engineering

It can be desirable to modify the antibody of the invention with respect to effector function, so as to enhance, e.g., the effectiveness of the antibody in treating cancer. For  
10 example, cysteine residue(s) can be introduced into the Fc region, thereby allowing interchain disulfide bond formation in this region. The homodimeric antibody thus generated can have improved internalization capability and/or increased complement-mediated cell killing and antibody-dependent cellular cytotoxicity (ADCC). See Caron et al., J. Exp Med., 176: 1191-1195 (1992) and Shopes, J. Immunol., 148: 2918-2922  
15 (1992). Homodimeric antibodies with enhanced anti-tumor activity can also be prepared using heterobifunctional cross-linkers as described in Wolff et al. Cancer Research, 53: 2560-2565 (1993). Alternatively, an antibody can be engineered that has dual Fc regions and can thereby have enhanced complement lysis and ADCC capabilities. See Stevenson et al., Anti-Cancer Drug Design, 3: 219-230 (1989).

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### 5.13.8 Immunoconjugates

The invention also pertains to immunoconjugates comprising an antibody conjugated to a cytotoxic agent such as a chemotherapeutic agent, toxin (e.g., an enzymatically active toxin of bacterial, fungal, plant, or animal origin, or fragments  
25 thereof), or a radioactive isotope (i.e., a radioconjugate).

Chemotherapeutic agents useful in the generation of such immunoconjugates have been described above. Enzymatically active toxins and fragments thereof that can be used include diphtheria A chain, nonbinding active fragments of diphtheria toxin, exotoxin A chain (from *Pseudomonas aeruginosa*), ricin A chain, abrin A chain,  
30 modeccin A chain, alpha-sarcin, Aleurites fordii proteins, dianthin proteins, *Phytolaca americana* proteins (PAPI, PAPII, and PAP-S), momordica charantia inhibitor, curcumin,

croton, saponaria officinalis inhibitor, gelonin, mitogellin, restrictocin, phenomycin, enomycin, and the tricothecenes. A variety of radionuclides are available for the production of radioconjugated antibodies. Examples include  $^{212}\text{Bi}$ ,  $^{131}\text{I}$ ,  $^{131}\text{In}$ ,  $^{90}\text{Y}$ , and  $^{186}\text{Re}$ .

5           Conjugates of the antibody and cytotoxic agent are made using a variety of bifunctional protein-coupling agents such as N-succinimidyl-3-(2-pyridyldithiol) propionate (SPDP), iminothiolane (IT), bifunctional derivatives of imidoesters (such as dimethyl adipimidate HCL), active esters (such as disuccinimidyl suberate), aldehydes (such as glutaraldehyde), bis-azido compounds (such as bis (p-azidobenzoyl)  
10 hexanediamine), bis-diazonium derivatives (such as bis-(p-diazoniumbenzoyl)-ethylenediamine), diisocyanates (such as tolyene 2,6-diisocyanate), and bis-active fluorine compounds (such as 1,5-difluoro-2,4-dinitrobenzene). For example, a ricin immunotoxin can be prepared as described in Vitetta et al., Science, 238: 1098 (1987). Carbon-14-labeled 1-isothiocyanatobenzyl-3-methyldiethylene triaminepentaacetic acid  
15 (MX-DTPA) is an exemplary chelating agent for conjugation of radionucleotide to the antibody. See WO94/11026.

          In another embodiment, the antibody can be conjugated to a "receptor" (such as streptavidin) for utilization in tumor pretargeting wherein the antibody-receptor conjugate is administered to the patient, followed by removal of unbound conjugate from the  
20 circulation using a clearing agent and then administration of a "ligand" (e.g., avidin) that is in turn conjugated to a cytotoxic agent.

#### 4.14 COMPUTER READABLE SEQUENCES

          In one application of this embodiment, a nucleotide sequence of the present  
25 invention can be recorded on computer readable media. As used herein, "computer readable media" refers to any medium which can be read and accessed directly by a computer. Such media include, but are not limited to: magnetic storage media, such as floppy discs, hard disc storage medium, and magnetic tape; optical storage media such as CD-ROM; electrical storage media such as RAM and ROM; and hybrids of these  
30 categories such as magnetic/optical storage media. A skilled artisan can readily appreciate how any of the presently known computer readable mediums can be used to

create a manufacture comprising computer readable medium having recorded thereon a nucleotide sequence of the present invention. As used herein, "recorded" refers to a process for storing information on computer readable medium. A skilled artisan can readily adopt any of the presently known methods for recording information on computer readable medium to generate manufactures comprising the nucleotide sequence information of the present invention.

A variety of data storage structures are available to a skilled artisan for creating a computer readable medium having recorded thereon a nucleotide sequence of the present invention. The choice of the data storage structure will generally be based on the means chosen to access the stored information. In addition, a variety of data processor programs and formats can be used to store the nucleotide sequence information of the present invention on computer readable medium. The sequence information can be represented in a word processing text file, formatted in commercially-available software such as WordPerfect and Microsoft Word, or represented in the form of an ASCII file, stored in a database application, such as DB2, Sybase, Oracle, or the like. A skilled artisan can readily adapt any number of data processor structuring formats (*e.g.* text file or database) in order to obtain computer readable medium having recorded thereon the nucleotide sequence information of the present invention.

By providing any of the nucleotide sequences SEQ ID NO:1-739 or a representative fragment thereof; or a nucleotide sequence at least 95% identical to any of the nucleotide sequences of SEQ ID NO:1-739 in computer readable form, a skilled artisan can routinely access the sequence information for a variety of purposes. Computer software is publicly available which allows a skilled artisan to access sequence information provided in a computer readable medium. The examples which follow demonstrate how software which implements the BLAST (Altschul et al., J. Mol. Biol. 215:403-410 (1990)) and BLAZE (Brutlag et al., Comp. Chem. 17:203-207 (1993)) search algorithms on a Sybase system is used to identify open reading frames (ORFs) within a nucleic acid sequence. Such ORFs may be protein encoding fragments and may be useful in producing commercially important proteins such as enzymes used in fermentation reactions and in the production of commercially useful metabolites.

As used herein, "a computer-based system" refers to the hardware means, software means, and data storage means used to analyze the nucleotide sequence information of the present invention. The minimum hardware means of the computer-based systems of the present invention comprises a central processing unit  
5 (CPU), input means, output means, and data storage means. A skilled artisan can readily appreciate that any one of the currently available computer-based systems are suitable for use in the present invention. As stated above, the computer-based systems of the present invention comprise a data storage means having stored therein a nucleotide sequence of the present invention and the necessary hardware means and software means for  
10 supporting and implementing a search means. As used herein, "data storage means" refers to memory which can store nucleotide sequence information of the present invention, or a memory access means which can access manufactures having recorded thereon the nucleotide sequence information of the present invention.

As used herein, "search means" refers to one or more programs which are  
15 implemented on the computer-based system to compare a target sequence or target structural motif with the sequence information stored within the data storage means. Search means are used to identify fragments or regions of a known sequence which match a particular target sequence or target motif. A variety of known algorithms are disclosed publicly and a variety of commercially available software for conducting search  
20 means are and can be used in the computer-based systems of the present invention. Examples of such software includes, but is not limited to, Smith-Waterman, MacPattern (EMBL), BLASTN and BLASTA (NPOLYPEPTIDEIA). A skilled artisan can readily recognize that any one of the available algorithms or implementing software packages for conducting homology searches can be adapted for use in the present computer-based  
25 systems. As used herein, a "target sequence" can be any nucleic acid or amino acid sequence of six or more nucleotides or two or more amino acids. A skilled artisan can readily recognize that the longer a target sequence is, the less likely a target sequence will be present as a random occurrence in the database. The most preferred sequence length of a target sequence is from about 10 to 300 amino acids, more preferably from about 30  
30 to 100 nucleotide residues. However, it is well recognized that searches for

commercially important fragments, such as sequence fragments involved in gene expression and protein processing, may be of shorter length.

As used herein, "a target structural motif," or "target motif," refers to any rationally selected sequence or combination of sequences in which the sequence(s) are chosen based on a three-dimensional configuration which is formed upon the folding of the target motif. There are a variety of target motifs known in the art. Protein target motifs include, but are not limited to, enzyme active sites and signal sequences. Nucleic acid target motifs include, but are not limited to, promoter sequences, hairpin structures and inducible expression elements (protein binding sequences).

#### 4.15 TRIPLE HELIX FORMATION

In addition, the fragments of the present invention, as broadly described, can be used to control gene expression through triple helix formation or antisense DNA or RNA, both of which methods are based on the binding of a polynucleotide sequence to DNA or RNA. Polynucleotides suitable for use in these methods are preferably 20 to 40 bases in length and are designed to be complementary to a region of the gene involved in transcription (triple helix - see Lee et al., Nucl. Acids Res. 6:3073 (1979); Cooney et al., Science 15241:456 (1988); and Dervan et al., Science 251:1360 (1991)) or to the mRNA itself (antisense - Olmno, J. Neurochem. 56:560 (1991); Oligodeoxynucleotides as Antisense Inhibitors of Gene Expression, CRC Press, Boca Raton, FL (1988)). Triple helix-formation optimally results in a shut-off of RNA transcription from DNA, while antisense RNA hybridization blocks translation of an mRNA molecule into polypeptide. Both techniques have been demonstrated to be effective in model systems. Information contained in the sequences of the present invention is necessary for the design of an antisense or triple helix oligonucleotide.

#### 4.16 DIAGNOSTIC ASSAYS AND KITS

The present invention further provides methods to identify the presence or expression of one of the ORFs of the present invention, or homolog thereof, in a test sample, using a nucleic acid probe or antibodies of the present invention, optionally conjugated or otherwise associated with a suitable label.

In general, methods for detecting a polynucleotide of the invention can comprise contacting a sample with a compound that binds to and forms a complex with the polynucleotide for a period sufficient to form the complex, and detecting the complex, so that if a complex is detected, a polynucleotide of the invention is detected in the sample.

5 Such methods can also comprise contacting a sample under stringent hybridization conditions with nucleic acid primers that anneal to a polynucleotide of the invention under such conditions, and amplifying annealed polynucleotides, so that if a polynucleotide is amplified, a polynucleotide of the invention is detected in the sample.

In general, methods for detecting a polypeptide of the invention can comprise  
10 contacting a sample with a compound that binds to and forms a complex with the polypeptide for a period sufficient to form the complex, and detecting the complex, so that if a complex is detected, a polypeptide of the invention is detected in the sample.

In detail, such methods comprise incubating a test sample with one or more of the antibodies or one or more of the nucleic acid probes of the present invention and assaying  
15 for binding of the nucleic acid probes or antibodies to components within the test sample.

Conditions for incubating a nucleic acid probe or antibody with a test sample vary. Incubation conditions depend on the format employed in the assay, the detection methods employed, and the type and nature of the nucleic acid probe or antibody used in the assay. One skilled in the art will recognize that any one of the commonly available  
20 hybridization, amplification or immunological assay formats can readily be adapted to employ the nucleic acid probes or antibodies of the present invention. Examples of such assays can be found in Chard, T., *An Introduction to Radioimmunoassay and Related Techniques*, Elsevier Science Publishers, Amsterdam, The Netherlands (1986); Bullock, G.R. et al., *Techniques in Immunocytochemistry*, Academic Press, Orlando, FL Vol. 1 (1982), Vol. 2 (1983), Vol. 3 (1985); Tijssen, P., *Practice and Theory of immunoassays: Laboratory Techniques in Biochemistry and Molecular Biology*, Elsevier Science Publishers, Amsterdam, The Netherlands (1985). The test samples of the present invention include cells, protein or membrane extracts of cells, or biological fluids such as sputum, blood, serum, plasma, or urine. The test sample used in the above-described  
25 method will vary based on the assay format, nature of the detection method and the tissues, cells or extracts used as the sample to be assayed. Methods for preparing protein  
30

extracts or membrane extracts of cells are well known in the art and can be readily be adapted in order to obtain a sample which is compatible with the system utilized.

In another embodiment of the present invention, kits are provided which contain the necessary reagents to carry out the assays of the present invention. Specifically, the invention provides a compartment kit to receive, in close confinement, one or more  
5 containers which comprises: (a) a first container comprising one of the probes or antibodies of the present invention; and (b) one or more other containers comprising one or more of the following: wash reagents, reagents capable of detecting presence of a bound probe or antibody.

10 In detail, a compartment kit includes any kit in which reagents are contained in separate containers. Such containers include small glass containers, plastic containers or strips of plastic or paper. Such containers allows one to efficiently transfer reagents from one compartment to another compartment such that the samples and reagents are not cross-contaminated, and the agents or solutions of each container can be added in a  
15 quantitative fashion from one compartment to another. Such containers will include a container which will accept the test sample, a container which contains the antibodies used in the assay, containers which contain wash reagents (such as phosphate buffered saline, Tris-buffers, etc.), and containers which contain the reagents used to detect the bound antibody or probe. Types of detection reagents include labeled nucleic acid probes,  
20 labeled secondary antibodies, or in the alternative, if the primary antibody is labeled, the enzymatic, or antibody binding reagents which are capable of reacting with the labeled antibody. One skilled in the art will readily recognize that the disclosed probes and antibodies of the present invention can be readily incorporated into one of the established kit formats which are well known in the art.

25

#### **4.17 MEDICAL IMAGING**

The novel polypeptides and binding partners of the invention are useful in medical imaging of sites expressing the molecules of the invention (e.g., where the polypeptide of the invention is involved in the immune response, for imaging sites of  
30 inflammation or infection). See, e.g., Kunkel et al., U.S. Pat. NO. 5,413,778. Such methods involve chemical attachment of a labeling or imaging agent, administration of



the labeled polypeptide to a subject in a pharmaceutically acceptable carrier, and imaging the labeled polypeptide *in vivo* at the target site.

#### 4.18 SCREENING ASSAYS

5           Using the isolated proteins and polynucleotides of the invention, the present invention further provides methods of obtaining and identifying agents which bind to a polypeptide encoded by an ORF corresponding to any of the nucleotide sequences set forth in SEQ ID NO:1-739, or bind to a specific domain of the polypeptide encoded by the nucleic acid. In detail, said method comprises the steps of:

- 10           (a)     contacting an agent with an isolated protein encoded by an ORF of the present invention, or nucleic acid of the invention; and
- (b)     determining whether the agent binds to said protein or said nucleic acid.

             In general, therefore, such methods for identifying compounds that bind to a polynucleotide of the invention can comprise contacting a compound with a

15           polynucleotide of the invention for a time sufficient to form a polynucleotide/compound complex, and detecting the complex, so that if a polynucleotide/compound complex is detected, a compound that binds to a polynucleotide of the invention is identified.

             Likewise, in general, therefore, such methods for identifying compounds that bind to a polypeptide of the invention can comprise contacting a compound with a polypeptide

20           of the invention for a time sufficient to form a polypeptide/compound complex, and detecting the complex, so that if a polypeptide/compound complex is detected, a compound that binds to a polynucleotide of the invention is identified.

             Methods for identifying compounds that bind to a polypeptide of the invention can also comprise contacting a compound with a polypeptide of the invention in a cell for

25           a time sufficient to form a polypeptide/compound complex, wherein the complex drives expression of a receptor gene sequence in the cell, and detecting the complex by detecting reporter gene sequence expression, so that if a polypeptide/compound complex is detected, a compound that binds a polypeptide of the invention is identified.

             Compounds identified via such methods can include compounds which modulate

30           the activity of a polypeptide of the invention (that is, increase or decrease its activity, relative to activity observed in the absence of the compound). Alternatively, compounds

identified via such methods can include compounds which modulate the expression of a polynucleotide of the invention (that is, increase or decrease expression relative to expression levels observed in the absence of the compound). Compounds, such as compounds identified via the methods of the invention, can be tested using standard  
5 assays well known to those of skill in the art for their ability to modulate activity/expression.

The agents screened in the above assay can be, but are not limited to, peptides, carbohydrates, vitamin derivatives, or other pharmaceutical agents. The agents can be selected and screened at random or rationally selected or designed using protein modeling  
10 techniques.

For random screening, agents such as peptides, carbohydrates, pharmaceutical agents and the like are selected at random and are assayed for their ability to bind to the protein encoded by the ORF of the present invention. Alternatively, agents may be rationally selected or designed. As used herein, an agent is said to be "rationally selected  
15 or designed" when the agent is chosen based on the configuration of the particular protein. For example, one skilled in the art can readily adapt currently available procedures to generate peptides, pharmaceutical agents and the like, capable of binding to a specific peptide sequence, in order to generate rationally designed antipeptide peptides, for example see Hurby et al., Application of Synthetic Peptides: Antisense Peptides," In  
20 Synthetic Peptides, A User's Guide, W.H. Freeman, NY (1992), pp. 289-307, and Kaspczak et al., Biochemistry 28:9230-8 (1989), or pharmaceutical agents, or the like.

In addition to the foregoing, one class of agents of the present invention, as broadly described, can be used to control gene expression through binding to one of the ORFs or EMFs of the present invention. As described above, such agents can be  
25 randomly screened or rationally designed/selected. Targeting the ORF or EMF allows a skilled artisan to design sequence specific or element specific agents, modulating the expression of either a single ORF or multiple ORFs which rely on the same EMF for expression control. One class of DNA binding agents are agents which contain base residues which hybridize or form a triple helix formation by binding to DNA or RNA.  
30 Such agents can be based on the classic phosphodiester, ribonucleic acid backbone, or

can be a variety of sulfhydryl or polymeric derivatives which have base attachment capacity.

Agents suitable for use in these methods preferably contain 20 to 40 bases and are designed to be complementary to a region of the gene involved in transcription (triple helix - see Lee et al., Nucl. Acids Res. 6:3073 (1979); Cooney et al., Science 241:456 (1988); and Dervan et al., Science 251:1360 (1991)) or to the mRNA itself (antisense - Okano, J. Neurochem. 56:560 (1991); Oligodeoxynucleotides as Antisense Inhibitors of Gene Expression, CRC Press, Boca Raton, FL (1988)). Triple helix-formation optimally results in a shut-off of RNA transcription from DNA, while antisense RNA hybridization blocks translation of an mRNA molecule into polypeptide. Both techniques have been demonstrated to be effective in model systems. Information contained in the sequences of the present invention is necessary for the design of an antisense or triple helix oligonucleotide and other DNA binding agents.

Agents which bind to a protein encoded by one of the ORFs of the present invention can be used as a diagnostic agent. Agents which bind to a protein encoded by one of the ORFs of the present invention can be formulated using known techniques to generate a pharmaceutical composition.

#### 4.19 USE OF NUCLEIC ACIDS AS PROBES

Another aspect of the subject invention is to provide for polypeptide-specific nucleic acid hybridization probes capable of hybridizing with naturally occurring nucleotide sequences. The hybridization probes of the subject invention may be derived from any of the nucleotide sequences SEQ ID NO:1-739. Because the corresponding gene is only expressed in a limited number of tissues, a hybridization probe derived from any of the nucleotide sequences SEQ ID NO:1-739 can be used as an indicator of the presence of RNA of cell type of such a tissue in a sample.

Any suitable hybridization technique can be employed, such as, for example, in situ hybridization. PCR as described in US Patents Nos. 4,683,195 and 4,965,188 provides additional uses for oligonucleotides based upon the nucleotide sequences. Such probes used in PCR may be of recombinant origin, may be chemically synthesized, or a mixture of both. The probe will comprise a discrete nucleotide sequence for the detection

of identical sequences or a degenerate pool of possible sequences for identification of closely related genomic sequences.

Other means for producing specific hybridization probes for nucleic acids include the cloning of nucleic acid sequences into vectors for the production of mRNA probes.

5 Such vectors are known in the art and are commercially available and may be used to synthesize RNA probes *in vitro* by means of the addition of the appropriate RNA polymerase as T7 or SP6 RNA polymerase and the appropriate radioactively labeled nucleotides. The nucleotide sequences may be used to construct hybridization probes for mapping their respective genomic sequences. The nucleotide sequence provided herein  
10 may be mapped to a chromosome or specific regions of a chromosome using well known genetic and/or chromosomal mapping techniques. These techniques include in situ hybridization, linkage analysis against known chromosomal markers, hybridization screening with libraries or flow-sorted chromosomal preparations specific to known chromosomes, and the like. The technique of fluorescent in situ hybridization of  
15 chromosome spreads has been described, among other places, in Verma et al (1988) Human Chromosomes: A Manual of Basic Techniques, Pergamon Press, New York NY.

Fluorescent *in situ* hybridization of chromosomal preparations and other physical chromosome mapping techniques may be correlated with additional genetic map data. Examples of genetic map data can be found in the 1994 Genome Issue of Science  
20 (265:1981f). Correlation between the location of a nucleic acid on a physical chromosomal map and a specific disease (or predisposition to a specific disease) may help delimit the region of DNA associated with that genetic disease. The nucleotide sequences of the subject invention may be used to detect differences in gene sequences between normal, carrier or affected individuals.

#### 25 4.20 PREPARATION OF SUPPORT BOUND OLIGONUCLEOTIDES

Oligonucleotides, i.e., small nucleic acid segments, may be readily prepared by, for example, directly synthesizing the oligonucleotide by chemical means, as is commonly practiced using an automated oligonucleotide synthesizer.

Support bound oligonucleotides may be prepared by any of the methods known to  
30 those of skill in the art using any suitable support such as glass, polystyrene or Teflon. One strategy is to precisely spot oligonucleotides synthesized by standard synthesizers.

Immobilization can be achieved using passive adsorption (Inouye & Hondo, (1990) *J. Clin. Microbiol.* 28(6) 1469-72); using UV light (Nagata *et al.*, 1985; Dahlen *et al.*, 1987; Morrissey & Collins, (1989) *Mol. Cell Probes* 3(2) 189-207) or by covalent binding of base modified DNA (Keller *et al.*, 1988; 1989); all references being specifically incorporated  
5 herein.

Another strategy that may be employed is the use of the strong biotin-streptavidin interaction as a linker. For example, Broude *et al.* (1994) *Proc. Natl. Acad. Sci. USA* 91(8) 3072-6, describe the use of biotinylated probes, although these are duplex probes, that are immobilized on streptavidin-coated magnetic beads. Streptavidin-coated beads may be  
10 purchased from Dynal, Oslo. Of course, this same linking chemistry is applicable to coating any surface with streptavidin. Biotinylated probes may be purchased from various sources, such as, e.g., Operon Technologies (Alameda, CA).

Nunc Laboratories (Naperville, IL) is also selling suitable material that could be used. Nunc Laboratories have developed a method by which DNA can be covalently bound  
15 to the microwell surface termed CovaLink NH. CovaLink NH is a polystyrene surface grafted with secondary amino groups (>NH) that serve as bridge-heads for further covalent coupling. CovaLink Modules may be purchased from Nunc Laboratories. DNA molecules may be bound to CovaLink exclusively at the 5'-end by a phosphoramidate bond, allowing immobilization of more than 1 pmol of DNA (Rasmussen *et al.*, (1991) *Anal. Biochem.*  
20 198(1) 138-42).

The use of CovaLink NH strips for covalent binding of DNA molecules at the 5'-end has been described (Rasmussen *et al.*, (1991). In this technology, a phosphoramidate bond is employed (Chu *et al.*, (1983) *Nucleic Acids Res.* 11(8) 6513-29). This is beneficial as immobilization using only a single covalent bond is preferred. The phosphoramidate bond  
25 joins the DNA to the CovaLink NH secondary amino groups that are positioned at the end of spacer arms covalently grafted onto the polystyrene surface through a 2 nm long spacer arm. To link an oligonucleotide to CovaLink NH via an phosphoramidate bond, the oligonucleotide terminus must have a 5'-end phosphate group. It is, perhaps, even possible for biotin to be covalently bound to CovaLink and then streptavidin used to bind the probes.

30 More specifically, the linkage method includes dissolving DNA in water (7.5 ng/ul) and denaturing for 10 min. at 95°C and cooling on ice for 10 min. Ice-cold 0.1 M

1-methylimidazole, pH 7.0 (1-MeIm<sub>7</sub>), is then added to a final concentration of 10 mM 1-MeIm<sub>7</sub>. A ss DNA solution is then dispensed into CovaLink NH strips (75 ul/well) standing on ice.

Carbodiimide 0.2 M 1-ethyl-3-(3-dimethylaminopropyl)-carbodiimide (EDC),  
5 dissolved in 10 mM 1-MeIm<sub>7</sub>, is made fresh and 25 ul added per well. The strips are incubated for 5 hours at 50°C. After incubation the strips are washed using, e.g., Nunc-Immuno Wash; first the wells are washed 3 times, then they are soaked with washing solution for 5 min., and finally they are washed 3 times (where in the washing solution is 0.4 N NaOH, 0.25% SDS heated to 50°C).

10 It is contemplated that a further suitable method for use with the present invention is that described in PCT Patent Application WO 90/03382 (Southern & Maskos), incorporated herein by reference. This method of preparing an oligonucleotide bound to a support involves attaching a nucleoside 3'-reagent through the phosphate group by a covalent phosphodiester link to aliphatic hydroxyl groups carried by the support. The  
15 oligonucleotide is then synthesized on the supported nucleoside and protecting groups removed from the synthetic oligonucleotide chain under standard conditions that do not cleave the oligonucleotide from the support. Suitable reagents include nucleoside phosphoramidite and nucleoside hydrogen phosphorate.

An on-chip strategy for the preparation of DNA probe for the preparation of DNA  
20 probe arrays may be employed. For example, addressable laser-activated photodeprotection may be employed in the chemical synthesis of oligonucleotides directly on a glass surface, as described by Fodor *et al.* (1991) Science 251(4995) 767-73, incorporated herein by reference. Probes may also be immobilized on nylon supports as described by Van Ness *et al.* (1991) Nucleic Acids Res. 19(12) 3345-50; or linked to Teflon using the method of  
25 Duncan & Cavalier (1988) Anal. Biochem. 169(1) 104-8; all references being specifically incorporated herein.

To link an oligonucleotide to a nylon support, as described by Van Ness *et al.* (1991), requires activation of the nylon surface via alkylation and selective activation of the 5'-amine of oligonucleotides with cyanuric chloride.

30 One particular way to prepare support bound oligonucleotides is to utilize the light-generated synthesis described by Pease *et al.*, (1994) PNAS USA 91(11) 5022-6,

incorporated herein by reference). These authors used current photolithographic techniques to generate arrays of immobilized oligonucleotide probes (DNA chips). These methods, in which light is used to direct the synthesis of oligonucleotide probes in high-density, miniaturized arrays, utilize photolabile 5'-protected *N*-acyl-deoxynucleoside phosphoramidites, surface linker chemistry and versatile combinatorial synthesis strategies. A matrix of 256 spatially defined oligonucleotide probes may be generated in this manner.

#### 4.21 PREPARATION OF NUCLEIC ACID FRAGMENTS

The nucleic acids may be obtained from any appropriate source, such as cDNAs, genomic DNA, chromosomal DNA, microdissected chromosome bands, cosmid or YAC inserts, and RNA, including mRNA without any amplification steps. For example, Sambrook *et al.* (1989) describes three protocols for the isolation of high molecular weight DNA from mammalian cells (p. 9.14-9.23).

DNA fragments may be prepared as clones in M13, plasmid or lambda vectors and/or prepared directly from genomic DNA or cDNA by PCR or other amplification methods. Samples may be prepared or dispensed in multiwell plates. About 100-1000 ng of DNA samples may be prepared in 2-500 µl of final volume.

The nucleic acids would then be fragmented by any of the methods known to those of skill in the art including, for example, using restriction enzymes as described at 9.24-9.28 of Sambrook *et al.* (1989), shearing by ultrasound and NaOH treatment.

Low pressure shearing is also appropriate, as described by Schriefer *et al.* (1990) Nucleic Acids Res. 18(24) 7455-6, incorporated herein by reference). In this method, DNA samples are passed through a small French pressure cell at a variety of low to intermediate pressures. A lever device allows controlled application of low to intermediate pressures to the cell. The results of these studies indicate that low-pressure shearing is a useful alternative to sonic and enzymatic DNA fragmentation methods.

One particularly suitable way for fragmenting DNA is contemplated to be that using the two base recognition endonuclease, *Cvi*II, described by Fitzgerald *et al.* (1992) Nucleic Acids Res. 20(14) 3753-62. These authors described an approach for the rapid fragmentation and fractionation of DNA into particular sizes that they contemplated to be suitable for shotgun cloning and sequencing.

The restriction endonuclease *Cvi*II normally cleaves the recognition sequence PuGCPy between the G and C to leave blunt ends. Atypical reaction conditions, which alter the specificity of this enzyme (*Cvi*II\*\*), yield a quasi-random distribution of DNA fragments from the small molecule pUC19 (2688 base pairs). Fitzgerald *et al.* (1992) quantitatively evaluated the randomness of this fragmentation strategy, using a *Cvi*II\*\* digest of pUC19 that was size fractionated by a rapid gel filtration method and directly ligated, without end repair, to a lac Z minus M13 cloning vector. Sequence analysis of 76 clones showed that *Cvi*II\*\* restricts pyGCPy and PuGCPu, in addition to PuGCPy sites, and that new sequence data is accumulated at a rate consistent with random fragmentation.

As reported in the literature, advantages of this approach compared to sonication and agarose gel fractionation include: smaller amounts of DNA are required (0.2-0.5 ug instead of 2-5 ug); and fewer steps are involved (no preligation, end repair, chemical extraction, or agarose gel electrophoresis and elution are needed).

Irrespective of the manner in which the nucleic acid fragments are obtained or prepared, it is important to denature the DNA to give single stranded pieces available for hybridization. This is achieved by incubating the DNA solution for 2-5 minutes at 80-90°C. The solution is then cooled quickly to 2°C to prevent renaturation of the DNA fragments before they are contacted with the chip. Phosphate groups must also be removed from genomic DNA by methods known in the art.

#### 4.22 PREPARATION OF DNA ARRAYS

Arrays may be prepared by spotting DNA samples on a support such as a nylon membrane. Spotting may be performed by using arrays of metal pins (the positions of which correspond to an array of wells in a microtiter plate) to repeated by transfer of about 20 nl of a DNA solution to a nylon membrane. By offset printing, a density of dots higher than the density of the wells is achieved. One to 25 dots may be accommodated in 1 mm<sup>2</sup>, depending on the type of label used. By avoiding spotting in some preselected number of rows and columns, separate subsets (subarrays) may be formed. Samples in one subarray may be the same genomic segment of DNA (or the same gene) from different individuals, or may be different, overlapped genomic clones. Each of the subarrays may represent replica spotting of the same samples. In one example, a selected gene segment may be amplified from 64 patients. For each patient, the amplified gene segment may be in one 96-well plate



(all 96 wells containing the same sample). A plate for each of the 64 patients is prepared. By using a 96-pin device, all samples may be spotted on one 8 x 12 cm membrane. Subarrays may contain 64 samples, one from each patient. Where the 96 subarrays are identical, the dot span may be 1 mm<sup>2</sup> and there may be a 1 mm space between subarrays.

5           Another approach is to use membranes or plates (available from NUNC, Naperville, Illinois) which may be partitioned by physical spacers e.g. a plastic grid molded over the membrane, the grid being similar to the sort of membrane applied to the bottom of multiwell plates, or hydrophobic strips. A fixed physical spacer is not preferred for imaging by exposure to flat phosphor-storage screens or x-ray films.

10           The present invention is illustrated in the following examples. Upon consideration of the present disclosure, one of skill in the art will appreciate that many other embodiments and variations may be made in the scope of the present invention. Accordingly, it is intended that the broader aspects of the present invention not be limited to the disclosure of the following examples. The present invention is not to be limited in scope by the  
15   exemplified embodiments which are intended as illustrations of single aspects of the invention, and compositions and methods which are functionally equivalent are within the scope of the invention. Indeed, numerous modifications and variations in the practice of the invention are expected to occur to those skilled in the art upon consideration of the present preferred embodiments. Consequently, the only limitations which should be placed upon  
20   the scope of the invention are those which appear in the appended claims.

          All references cited within the body of the instant specification are hereby incorporated by reference in their entirety.

## 5.0    EXAMPLES

### 5.1    EXAMPLE 1

#### 25       Novel Nucleic Acid Sequences Obtained From Various Libraries

          A plurality of novel nucleic acids were obtained from cDNA libraries prepared from various human tissues and in some cases isolated from a genomic library derived from human chromosome using standard PCR, SBH sequence signature analysis and Sanger sequencing techniques. The inserts of the library were amplified with PCR using primers  
30   specific for the vector sequences which flank the inserts. Clones from cDNA libraries were

spotted on nylon membrane filters and screened with oligonucleotide probes (e.g., 7-mers) to obtain signature sequences. The clones were clustered into groups of similar or identical sequences. Representative clones were selected for sequencing.

In some cases, the 5' sequence of the amplified inserts was then deduced using a typical Sanger sequencing protocol. PCR products were purified and subjected to fluorescent dye terminator cycle sequencing. Single pass gel sequencing was done using a 377 Applied Biosystems (ABI) sequencer to obtain the novel nucleic acid sequences. In some cases RACE (Random Amplification of cDNA Ends) was performed to further extend the sequence in the 5' direction.

## 5.2 EXAMPLE 2

### Novel Contigs

The novel contigs of the invention were assembled from sequences that were obtained from a cDNA library by methods described in Example 1 above, and in some cases sequences obtained from one or more public databases. Chromatograms were base called and assembled using a software suite from University of Washington, Seattle containing three applications designated PHRED, PHRAP, and CONSED. The sequences for the resulting nucleic acid contigs are designated as SEQ ID NO: 1-739 and are provided in the attached Sequence Listing. The contigs were assembled using an EST sequence as a seed. Then a recursive algorithm was used to extend the seed EST into an extended assemblage, by pulling additional sequences from different databases (i.e., Hyseq's database containing EST sequences, dbEST version 120, gb pri 120, UniGene version 120, and Genpept 120) that belong to this assemblage. The algorithm terminated when there was no additional sequences from the above databases that would extend the assemblage. Inclusion of component sequences into the assemblage was based on a BLASTN hit to the extending assemblage with BLAST score greater than 300 and percent identity greater than 95%.

The nearest neighbor result for the assembled contig was obtained by a FASTA version 3 search against Genpept release 120, using FASTXY algorithm. FASTXY is an improved version of FASTA alignment which allows in-codon frame shifts. The nearest neighbor result showed the closest homologue for each assemblage from Genpept (and

contains the translated amino acid sequences for which the assemblage encodes). The nearest neighbor results for SEQ ID NO: 1-739 are shown in Table 2.

Tables 1, 2, and 3 follow. Table 1 shows the various tissue sources of SEQ ID NO: 1-739. Table 2 shows the nearest neighbor result for the assembled contig. The nearest neighbor result shows the closest homologue for each assemblage and contains the translated amino acid sequences for which the assemblage encodes. Table 2 also shows homologues with identifiable functions for SEQ ID NO: 1-739. The polypeptides were predicted using a software program called FASTY (available from <http://fasta.bioch.virginia.edu>) which selects a polypeptide based on a comparison of translated novel polynucleotides to known polynucleotides (W.R. Pearson, Methods in Enzymology, Vol. 183: pp. 63-98, (1990), herein incorporated by reference). Table 3 shows the predicted amino acid sequence corresponding to the novel nucleic acid contig sequences.

**Table 1 - Tissue Sources**

Tissue Origin	RNA Source	Hyseq Library Name	SEQ ID NOS:
adult brain	GIBCO	AB3001	28 46 54 62 95 117 134 175 188-189 324 330 337 356 369 371 378 386 389 396 432 435-436 468 472-473 476-477 483 486 518 538-539 543 545 557 565 571 573 578 582 598 613-614 619 627 632 634 639 687 709
adult brain	GIBCO	ABD003	5 12 46 52 57 66 79 91 97 134 144 148 150 162 164 172 175-176 181 186 193 250 323 325-327 330 334 338 362 367 369 371 378-379 386 388-389 392 396-397 399-401 403 416 422 435 444 449 451 454 461 463-464 468 472-473 483 486 494 506 511 513 516 520 523-524 526 529 533 536-537 539 545 548 552 556 558-559 562-563 565 567 569 573-574 576 579-580 582-584 590 593-594 598 602 606 613-614 619- 621 623-624 627 634 637 641 646 648 659 675 688-689 694 696-698 703 714 729
adult brain	Clontech	ABR001	57 162 164 227 266 316 334 356 367 385 438 468 512 524 528 557 582 590 621 627 631 634 689 714
adult brain	Clontech	ABR006	189 228 385 438 571 584 632 650 677
adult brain	Clontech	ABR008	1 3 5 11-25 31-32 46-47 55-57 59

Tissue Origin	RNA Source	Hyseq Library Name	SEQ ID NOS:
			61 65-67 69 75 79 91 103 108 111 113-114 126 132 150 160 162 164 171-172 186 188-189 193 202-203 206 210-212 220 222-224 227-229 233 235-236 243-247 251-252 257 264-266 268 275 313 324 328-331 334-335 338-339 343 346-347 351 355 357 359-361 365 367 370-371 378 380 382 386-389 391 396 399- 400 402 406 413 419-420 423 426 432 434 437-438 442 446 448-449 459-460 465 468 470 472-473 475 481-483 487 489-490 495-497 499 501 503-504 507-509 511 520 524 526 528 532-533 536 539-540 543- 546 551-552 556-557 563 565-567 569 572-573 576-577 579-580 582 584 586 590-591 593 595-597 599- 602 604 610-616 620-621 624-625 627-628 632 634 637-638 641 643- 644 646-647 650 653-657 660-662 668 672 675 677-678 680-681 688- 689 691 693 695-696 698 706-707 709 711 713-727 729 731 733-734 736 738-739
adult brain	Clontech	ABR011	334 476 634 677
adult brain	BioChain	ABR012	379 587
adult brain	Invitrogen	ABR013	334 634
adult brain	Invitrogen	ABT004	3 19 57 62 66 75 110 122 150 160 162 167 171 176 186 197 203 211 230 232 259 328-331 334 369 382 389 394 400 406 417 426 429 442 457 472 483-484 492 511 514 529 531 534 537 540 553 558 562 572 580 582-584 590 604 611 613 615 622 637 639 643-644 648 688-689 692 695
cultured preadipo- cytes	Stratagene	ADP001	16 37-39 66 109 120 141 144 193 273 316 331 333 338 389 415 429 442 444 464-465 475 489 501 511 513 531 534 539-540 545-546 557 583-584 590 596 602 607 613 615 619 622 629 632 634 643
adrenal gland	Clontech	ADR002	4-5 12 48 53 57 162 164 172 186 188 192 196 203 207 213 258 316 330-331 333 339 354 356-357 369 383 385 388 392 395 402 406 411 415 434 454-455 465 468 473 475 477 491 498 501 509 511 517 528- 529 532 537-539 542 545 558 560 565 567 576-577 586 600 606 615 621 624 627 632 634 647 653 660 667 683 689 696 714

Tissue Origin	RNA Source	Hyseq Library Name	SEQ ID NOS:
adult heart	GIBCO	AHR001	28 39 57 64-65 75 79 89 97-98 108 117 134 144 157 159-160 164-166 169 171 174 184 192-193 203 207 220 243 256 258 266-267 281 314 316 318 328-329 331 338-339 341 346 348 354 356-357 366-367 369 371 377-379 382 385-386 388 393 395-396 399-401 403 415 420 422 425 431-432 435-436 445 451 459 465 472-473 477 483 486 488 490 496 501 503 508 515 519-520 526 528 531 533-534 537-538 540-541 544 546 552 556-557 562-563 566- 571 573 576-581 583-584 586-587 594 602 606 608 611 613-615 618 620-621 626-628 632 634 641 643 646 648 653 659 667 676 678 687 689 696 703-704 708 711 714 729- 730
adult kidney	GIBCO	AKD001	3 28-29 48 56-57 67 79 84 93 106 117 134 138 140 144 156 160-164 168-170 172 177 183 188-189 192- 193 199 203 207 235 251 257 275 319 321-323 328-330 337 346-347 349 354-356 360 367-369 371 375 378-381 383-386 388-389 392 396- 397 399 401 404 407 409 411-412 415-416 420-422 427 432 436-437 439-440 444 451-456 458-459 464- 465 468 470 472-473 477 481 483 486-487 492 496 501 503 505-506 508 511 513-516 518 524 526 529 533 535 537-541 543 545-546 548 552 557 559-560 562-563 565-569 572-574 576-577 579-587 589-591 593-594 602 604-607 613-614 617- 618 620-624 627-628 630 632-635 637-638 640-642 644-645 652 662 664 667-668 677 682 685 687 689 694-696 698 703 716 723 728-729 732 734
adult kidney	Invitrogen	AKT002	92 136 154 160 164 178 271 314 347 353 360 367 376 378-379 386 391 402 409 423 432 449 451 477 490 494 503 526 528 531 534 538-539 541 545-546 559 566 579 584 588 594 602 613 621 624 632 647 652 689
adult lung	GIBCO	ALG001	56-57 67 69 98 113 134 144 164 172 191-192 270 321 328 338 369 371 374 378 380 388-389 396 405 411 416 424 443-444 456 473-474 482- 483 497 508 518 529 531 534 536

Tissue Origin	RNA Source	Hyseq Library Name	SEQ ID NOS:
			540 552 556 559 563 568 573 579-580 585-586 588-589 593 601-602 606 612-613 618 634 662 667 685 696 702 726 729-730
lymph node	Clontech	ALN001	28 57 79 113 164 172 179 193 240 325 332 367 378-379 386 388 402 485 526 580 586 603 613-614 621-622 628 634 662 667 686 734
young liver	GIBCO	ALV001	3 24 28 54 60 117 134 137 154 160 193 196 242 273 316 328-329 334 351 354 370-371 388 392 395-396 401 406 411 415 432 435 439 448 454-455 477 483 486-487 495 506 509 514 518 523-524 526 529 531 534 537-538 540 544 548 566 568 571 573 579 587-588 591 594 602 621 641 645 686 713 723
adult liver	Invitrogen	ALV002	3 24 27 56-57 65-66 71 79 92 97 106 134 140 164 192 200 214 220 232 240 242 271-272 291 313 316 328 347 349-350 353 355 357 368-369 371-372 378-379 381-382 385 397 430 435 448 457 459 471-472 475 485 487 502 505-506 511 520 530-531 533-534 537 540-541 543 548 566 574-575 579 582 588 590 612 623 640 648-649 681 687 689 710 714
adult ovary	Invitrogen	AOV001	3 10 14 28 54 56-58 62 65-66 68 73 75 79 98 127 144 154 162 164-165 172-174 182 186 188-189 192-196 206 213 224 234-235 241 243 248 253 261 273 275 289 314 316 321-322 325-327 329-331 333-334 336-338 340 343 345-348 354-357 367 369 371-372 378 382 386 388 395-397 399-402 404 407 411 415-416 419-420 425 427 429 431 435-437 441 444 451 453-459 465 468-470 472-475 481 485 490 494 496 501 503 509-510 513 517-518 522-524 526 528-529 531-534 537-542 545-546 548 552 554 556-557 559-560 562-563 565 567-569 572-579 581-582 584-588 590-591 593-598 602-604 606 611-615 618 620-623 627 629 631-632 635-638 643 647 652-654 657 659 661-662 667 674-675 677-678 682 684 689 693 695-698 703 705-707 714 717-718 723 729 731 738
adult placenta	Clontech	APL001	172 224 239 363 371 392 437 531 534 622 690 696

Tissue Origin	RNA Source	Hyseq Library Name	SEQ ID NOS:
placenta	Invitrogen	APL002	57 66 122 161 172 241 326 329 334 369 388 407 427 429 436 459 464 506 508 511 539 541 545 566 573 575 590 597 637 648 690
adult spleen	GIBCO	ASP001	28 57 65 78 93 95 117 134 156-157 172 186 188 194 214 273 314 319 331 334 338 344 354 371 374 392 436 457 471-473 478-479 481 483 515 526 528-529 541 548 557 559 563 565 569 573 585-587 603 606 613 615 618 621-622 627 632 634 637 643 654 671 689 696-698 701 712 739
testis	GIBCO	ATS001	3 67 134 160 192 235 327 329 337 342 371 375 378 380-381 396 399 415 431 436 441 451 472 477-478 483 486 494 496 503 522 524 526 531 533-534 538 541-542 546 548 557 568 573 577 579 581 584 594 596 618 641 658 662 689 700 714 729-730
adult bladder	Invitrogen	BLD001	28 57 112 161 164 172 192 194 250 334 354 370 397 404 487 513 526 531 534 545 572 599 602 620 634 651 659 672 689 713 725
bone marrow	Clontech	BMD001	10-11 28 31 54 57 62 75 78-83 88 131-133 135-137 141-143 157 159 164 171-173 176-177 187-189 192 195 200 202 205 207 218 225 282 314-318 325 330 334-335 337 346- 348 367 369 372 378 383 386 388 395 401 405 412-413 416 422 436 442-443 447 449 455 465 472 475 477 503 516 523 528-529 533-534 539 545 551 556 559 563 565-567 571 573-574 576 579-586 594 601- 602 606 613 620-623 628-629 634 638 642-643 646 656 659 666 686 689 691 696 698-699 703 705 714 720 726 729
bone marrow	Clontech	BMD002	2 15 23 35 49 54 57 59 78 81 114 156-157 164 171-172 189-190 202 223 240 325 334 346 357 367 379 381-382 388 397 412 454 465 482 490 509 516 526 535 537 563 566 579 595 600 638 640-641 654-655 676 689 714
adult colon	Invitrogen	CLN001	48 79 94 138 162 167 189 333 368- 369 375 386 404 409 414 435-436 455 470 525 541 548 553 567 603 634 656 659 689 694 721
adult cervix	BioChain	CVX001	3 28 35 54 57 79 83 95 97 113 117 154 162 164 172 176 220 235 248-

Tissue Origin	RNA Source	Hyseq Library Name	SEQ ID NOS:
			249 321 327 329 333 338 346 348 354 356 362 367-368 371 374-375 378-379 386 388-389 395 401-402 404 407 420 429 431 437 443 451 459 468 475 477 479 483 485 490 493-494 496 506 508 511 517 526 528 531 534 544 550 552 559 566 569 571-573 575-576 581-583 588 590 593-594 604 606 614 622 628 631-635 639 661-662 675 689 692 695 715 718 738
endothelial cells	Strategene	EDT001	3 28 31 39 54 58 65-66 79 89 144 160 173 187 189 191 193 197-199 207 220 230 267 273 314 324 326 329-331 336 347 354 369 372 378- 379 384 386 388 391-394 396-397 399 401 407 420 422 429 431-432 435-437 444 449 451 455 459 465 472 474-475 481-482 486 490 499- 501 503 506 511 513 515-517 520 522-524 528 531-534 538-539 541 545-546 548 550 552 557 559-560 563 565 567 569 571 573 577 579- 580 583-584 587-590 593-594 596- 597 599 602 611 614-615 618 620- 621 624 630 632-634 637-638 642- 643 647-648 651 675 677 680 682 694 696-698 703 708 714 719 724- 725 728-730 734
Genomic clones from the short arm of chromosome 8	Genomic DNA from Genetic Research	EPM001	38 41-45 118-121 164 198 292-312
Genomic clones from the short arm of chromosome 8	Genomic DNA from Genetic Research	EPM003	43 164 295
Genomic clones from the short arm of chromosome 8	Genomic DNA from Genetic Research	EPM004	121 164 306 482
Genomic clones from the short arm of chromosome 8	Genomic DNA from Genetic Research	EPM006	293



Tissue Origin	RNA Source	Hyseq Library Name	SEQ ID NOS:
esophagus	BioChain	ESO002	513 526
fetal brain	Clontech	FBR001	57 468 563 634
fetal brain	Clontech	FBR004	162 186 254 265 491 582
fetal brain	Clontech	FBR006	1-2 5-6 11-12 22-23 49 57 62 73 94 103 114 162 164 172 189 193 203 218 240 244 251-252 259 279 330- 331 334-335 346-347 351 367 378 386 388-389 399 413 420 422 424 434 442 444 448 465 468 470 472- 473 490 496 501 503-504 511 520 524 528 532-533 539 544-546 548 551 553 563 571 573 576 587 591 601 613 615-616 620-621 628 634 641 644 648 653 657 662 672-673 689 691 698 706 714 718 725-728 733 735-739
fetal brain	Clontech	FBRs03	444 587
fetal brain	Invitrogen	FBT002	17 66 157 162 164 186 190 193 250 270 324 331 334-335 338 346 354- 355 374 382 389-390 426 429-430 437 442 453 467 471 475 481 485 491 507-508 513-514 526 528 532 540 544 548 550 552-553 557-558 563 565-566 590 593 602 612 615 637 641 648 654 662 672 676 692 703
fetal heart	Invitrogen	FHR001	57 75 164 547
fetal kidney	Clontech	FKD001	57 164 172 179 188 194 208 218 230 240 250 330 334 369 388 401 413 439 454 465 529 546 550 573 576 581 583 594-596 602 634 648 667 676 689 698 706
fetal kidney	Clontech	FKD002	2 560
fetal kidney	Invitrogen	FKD007	565 596-597
fetal lung	Clontech	FLG001	75 164 355 386 428 455 513 524 528 631 689
fetal lung	Invitrogen	FLG003	30 157 162 169 188 243 253 256 283 330 392 400-401 404 407 424 428 435-436 479 506 508 520 530-531 534 572 578 584 602 611 613 631 654 658 662 676 689 701 716
fetal lung	Clontech	FLG004	371
fetal liver-spleen	Columbia University	FLS001	2-3 5 26 29 31 35 48 54-58 60 62 65 67 70 74-77 79-80 84-87 89 92 96 98-100 104 117 122-130 138 140 144-158 160 162 164 172-173 185- 186 188-189 192-194 196 199-200 207 214 218-219 237-238 241 269 273 280 282 314-316 318-322 324 327 329-331 334-335 337 340 345 348-350 354-358 363-364 367-371

Tissue Origin	RNA Source	Hyseq Library Name	SEQ ID NOS:
			373 375 377-380 382-383 385-386 388 394-396 399 402 409 411-412 418 420-422 424 427 431 435-437 440 442 448-451 453 455 459 461 464-465 470 472-473 475 477-478 480-485 488-490 501 503 505-506 509 511-513 515-518 520 522-524 526-534 538-539 541 543-547 549- 550 552-553 556-557 559-564 566- 567 569 571 573 576 578-580 582- 587 589 591-594 596-597 599-600 602 611-615 618 620-625 627-628 631-636 638 641-642 646 648 651 659-660 662-664 667-668 675-678 680-681 684 689-690 696-698 709 714 723 738
fetal liver-spleen	Columbia University	FLS002	15 31-32 39-40 47-49 52 56 60 65 69 72 75 78 84 97-98 100 104 115 123 138 140 144 146 152-153 157 161 164 172-173 182 188 194 196 199 220 241-242 246 249 253 255 266 273-275 280-281 288-291 314- 316 318-319 321-322 324 329-331 336-339 343 347-350 353-354 357- 358 363 367 369-370 372 374 378- 380 382-383 386 388-389 393-397 399 405 407 409-410 412 421 424 432 435 439 448 450-451 453-457 459 461 464-465 470 472-475 477 479-481 483 485 488 490 497 501 503 506 509 511-513 516-518 520 524 527-528 531-532 534 539 541- 546 556 559-560 565-566 569 571 574 576 579 582-586 588 590 597- 599 602-604 606 615 618 620-621 623 625 627 632-634 639 641 644 648 666-668 675-676 681 684 689- 690 696-697 701 703 714 719 723 734-735
fetal liver-spleen	Columbia University	FLS003	60 79 157 190 690
fetal liver	Invitrogen	FLV001	3 27 35 48 50 56-57 66 75 92 94 105 157 161 164 176 189 209 220 243 272 324 328 333 335 353 369- 370 381 392 396 429-430 435 439- 440 442 444 465 471 483 487 502 506 513-514 519 534-535 537 548 554 566 568 576-577 580 582 590 613 621 645 648-649 689
fetal liver	Clontech	FLV002	343
fetal muscle	Invitrogen	FMS001	51 79 97 108-110 166 194 196 266 341 352 380 389 402 407 444 464

Tissue Origin	RNA Source	Hyseq Library Name	SEQ ID NOS:
			475 501 513 524 546 552 554 560 570 572 598 605 628 634 649 675 703-704 714 737
fetal muscle	Invitrogen	FMS002	524
fetal skin	Invitrogen	FSK001	31 33 35 48 57 63 67 75 112-114 117 157 162 164 172 178 180 188 196 220 243 254 319 324 328 330 333-334 367 369 371 375 379-383 386 388-389 400 404 407 412 419- 420 429 444 455 472-473 491 499 503 508 511 514 517 522-524 529 531 534 537 540 542 547 552 554 556-557 560 563 565 567 571-572 574 576 579 590 596 599 616 621 625 627 631-632 634 639-640 648 653-654 662 689 708 714
fetal skin	Invitrogen	FSK002	501 537
fetal spleen	BioChain	FSP001	465 729
umbilical cord	BioChain	FUC001	27-28 35 57 68 83 105 136 157 159- 160 164 188 191 225 279 315-316 321 328 334 363 367 369 378-379 383 386 388-389 392 397 406-407 413 415-416 427 440 449 455 458 461 464-465 468 473-475 479 485- 486 488 490 496 514 517 522 524 526 528-529 531 533-534 538 540 546 550 552 556-558 572 582 584- 585 587-588 594-597 602 606 613 616 618-619 631 634 637 651 689 696 698 706 729
fetal brain	GIBCO	HFB001	3 5 22 26 46 53 66 73 94 117 134 139 164 172-173 188-189 212 215 230-231 248 251 262 288-289 316 325 329-331 334 337-338 348 352 365-367 369 371 377-379 385-386 388 392 394 396 400 403 420 422 429 437 444-446 449 451 455 459 461-463 466-468 472-473 475 477 481 483 485-486 488 490-491 496 503-504 506 513 523-524 529 532- 533 539-541 545 548 550 552 557- 560 563 565-566 569 571 576-577 579-580 583-584 586 590 593-594 596-599 601-602 604 606 611 613 615 618 621-623 627-628 634-635 637 641 643 647 662 664-665 667 675 677 680 689 695-697 703 726
macrophage	Invitrogen	HMP001	97 518 532 569
infant brain	Columbia University	IB2002	28 46 56-57 59 67 75 78 109 117 122 129 144 157 162 164-165 172 176 180 190 193 212 220 226 236-

Tissue Origin	RNA Source	Hyseq Library Name	SEQ ID NOS:
			237 251 261-262 316 318 324 328-330 334-335 337 340 354-356 361 364-365 367 369 371-373 377-380 382 385-386 389 392 395 397 400 411 416 421-422 429 432 436 438 444 448 451 456 464-465 469 471-475 484 486 496 504-506 511 520 524 526 529 531 533-534 537-540 544-546 548 553 556 558 562 565 567 576 579-580 582 584 586 589-590 593 597-598 602 613-614 618 620-621 627-628 632 634 636 641 650 654 659 662 667 683 689 721 730
infant brain	Columbia University	IB2003	46 54 75 109 156 164 220 244 251 314 324-325 331 335 340 361-362 367 369 377-379 400 408 438 442 456 460 464 469 472 496 506 523-524 526 529 538 540 544-545 547 558 560-562 565 567 569 579 584 598 602 613 615 621 627 632 634 637 639 650 738
infant brain	Columbia University	IBM002	262 340 432 436 438 472 531 534 569 613 634
infant brain	Columbia University	IBS001	162 231 283 331 369 385 438 444 472 506 513 523 531 534 580 615 636 689
lung, fibroblast	Stratagene	LFB001	28 54 57 65 172 188 233 321 331 340 347 367 369 378-379 388 401 451 459 475 479 503 511 522 524 532 534 559-560 573 580 583 587 597 615 632 634 638 686 689 708
lung tumor	Invitrogen	LGT002	3 7 21 24 26 28 31 54 56-57 62-63 66 92-93 101 109 112 162 164 171-172 176 183 188-189 192-193 196 201-202 223 230 235 259 273-274 316 321 329-331 333-334 338 345 347-348 356 367 369 371-372 378-379 381-382 386 388-390 396 399-404 406 409 416 424-425 427 429 432 436-437 439 451 455-456 459 464-465 467 473 475 484-486 490 499 502-503 506 508 511 513-514 517-518 522 524 526 528 531-532 534-535 538-539 541 543-546 553 557-559 563 567-568 571 573 575-576 579-580 585-588 590-591 593-594 598 601-604 609 611-613 615 621 627-628 631-632 636-637 645 648 651-652 654 662 667 672 677 681 683 689 698 701-702 714 718 724 726 729 734
lymphocytes	ATCC	LPC001	4 31-32 35 57 65-66 70 110 116 156

Tissue Origin	RNA Source	Hyseq Library Name	SEQ ID NOS:
			162 164 230 243 250 282 287 326 328-330 334 336 346-347 359 378 386 388 397 407 414 416 419 472 497 520 525 539 545 549 551 582 590 606 615 618 621 631 634 686 692 698 701 714
leukocyte	GIBCO	LUC001	4 7 9-11 23 28 31 35 39 54 65 75- 76 79 90 97 110 117 134 152 157 159 162 164-167 171 173 176 188 193 199 204 207 220 244 253 255 314 316 318 321 324 326 329-330 337-339 346-347 352 354 356 367 369 371 378-379 382 388-389 392 396-397 400-402 405 415-416 420 422 429 432 435-436 443-444 449 454-455 457-459 465 479 481-486 491 497 501 503-504 506 508 511 514 516 520 523-525 529 532-533 535 538-539 545 548 552-554 556 559-560 562-563 565-566 569 571- 573 576 579 581 585-587 590 593- 594 598 600-602 604 606-609 613- 614 618 620-622 624 627 630 632- 634 636 638 643 645 660-662 667 678 682 684 686 689 691 693 696- 698 714 726
leukocyte	Clontech	LUC003	11 54 97 152 164 330 479 546 564- 565 593 613 627 634 646 696 729
melanoma from cell line ATCC #CRL 1424	Clontech	MEL004	2 57 67 79 164 171-173 188 193 196 232 321 337 341 346 367 379-380 388 407 427 454 472 477 482 501 520 539 545 552 556 579 588 593 598 611 621 631 648 665 714 730
mammary gland	Invitrogen	MMG001	3 20-21 29 31 54 56-57 63-66 79 94 109 112-113 117 122 125 138 141 154 160 162 164 172 176 186 189 192 204 214 220-221 232 238 251 255 257 273 276-278 324 326 328- 331 333 335 337 341-343 347 354- 355 357 367-371 374-375 379 382- 386 388-392 397 399-400 404 406- 408 410-411 425 431 435-436 444 451 455 457 459 461 464-465 470- 471 475 479 483 485 487-488 491 501 506-508 511 513-519 523-524 526 529 531-532 534-535 537 539- 540 542-545 552-554 557-560 563 566 569 572 577 580 584 587-588 590 597-598 602 604-605 609 611 613 615 624 627 631-634 637 639- 640 643 648-649 654 664 669-670 672-673 676-679 681 689 691-695 697-698 706 714 731 734 737

Tissue Origin	RNA Source	Hyseq Library Name	SEQ ID NOS:
induced neuron cells	Stratagene	NTD001	36 57 164 284 388 397 420 481 485 501 524 528-529 539 542 545 560 571 579 582 595 602 620 637 654 667 689 730
retinoid acid induced neuronal cells	Stratagene	NTR001	524 584 693
neuronal cells	Stratagene	NTU001	36-38 120 204 331 351 354 357 386 388 399 411 442 459 516 533 539 545 565 586 606 615 621 637-638 642 646 648 714 730
placenta	Clontech	PLA003	503 579 690
prostate	Clontech	PRT001	15 40 65 164 187 207 229 337 348 367 375 377-378 395 406 416 428 458 468 476 511 524 526 531 534 538 555 559 563 576 584 597 613 622 624 631 642 667 672 677 684 724 734
rectum	Invitrogen	REC001	57 67 164 260 331 343 370-371 380 382 384 404 409 436 444 475 485 498 513 524 526 540 542 552 554 581 615 619 624 627 634 654 659 671 689 714
salivary gland	Clontech	SAL001	21 84 106-107 152 179 238 246 255 273 287 371 378 383 401 407 420 455 475 477 509 512 515 521 541 548 565 570-571 573-574 589 606 628 634 636 652 689 703 738
skin fibroblast	ATCC	SFB002	192
skin fibroblast	ATCC	SFB003	464
small intestine	Clontech	SIN001	57 66 71 98 116 150 164 172 327 336 343 362 367 379 388 397 401- 402 417 429 433 436 496 526 528 533 590 602 620 631 634 667 678 711
skeletal muscle	Clontech	SKM001	3 57 66 101 164 172 256 266 325 379 385 449 468 485 487 518 552 554 566-567 570 582 584 590 606 611 628 631 738
spinal cord	Clontech	SPC001	10 54 57 66 75 100 102 114 144 164 175 193 199 215-216 325 334 337 367 370 380 385-386 406 411-413 419 429 466 470 486 518 526 529 531 534 574 579 585 587 590 604 620-621 631-632 634 642 644 648 659 688-689 691 693 695
adult spleen	Clontech	SPLc01	478 572
stomach	Clontech	STO001	26 90 164 218 358 369 386 468 475

Tissue Origin	RNA Source	Hyseq Library Name	SEQ ID NOS:
			485 526 532 569 576 579 581 586 603 631 634 677 682 689
thalamus	Clontech	THA002	17 31 57 66 109 127 164 217-218 262 315-316 324 330 357 369 386 388 400 406 435 456 459 464 468- 469 515-516 537 540-541 556 566 574 590 611 622 631 634 644 648 656 677-678 680
thymus	Clontech	THM001	6 15 26 54 79 164 172 187 193 201 264 291 315 329 331 351 356 367 397-398 401 407 412 424 427 429 435-436 443 451 474 478 482 549 563 565 567 569 576 578 581-582 610 615 621 631-632 634 648 662 667 669 679 689 693 696
thymus	Clontech	THMc02	3-6 8 11 16 18 34 58-59 67 132 149 162 164 167 172-173 186 188-189 193 200 203 216 223 232 239 255 263 265 319-320 331 333-334 355 359 370 373 377-380 382 387-390 393 395 398-399 402 404 408 420 427 434 436 467 475-476 503 508 518 524 526 532 540 560 563 565 571-572 576-577 579 582 598 601 603 612-613 615 621 627 632 634 639 641 648 651 657 659 662 672 677-678 684-686 689 696 699 706 714-716 722 726-729 732
thyroid gland	Clontech	THR001	5 29-30 40 54 57 66 72 79 117 144 160 164 166 170 172 176 183 188- 189 208-209 219 230 285-286 314 318 327 331 335 338 344 347 354 363 367 375 377-380 382 384-386 388 393 397 399 401-403 419 422 429 436 442 444 451 456 458-461 464 467-468 470 472-473 476-477 481 488 494 503 508-509 511 516 519-521 524 528-529 533 537-538 543 548 557 559-560 563 565-566 571-574 576 582 585 587 590-591 593-594 596-597 606 614-615 620- 621 623-624 627 631-634 640 650- 651 653 662 667 669-670 675 679 689 708 712 714
trachea	Clontech	TRC001	156 164 171 240 375 378 390 400 422 468 484 565 574 581 585 587 631 654 689 714
uterus	Clontech	UTR001	65 77 79 101 164 220 367 369 451 468 526 530 533 548 554 559 562 568 573 582 594 637 648 689

Table 2 - Nearest Neighbor Results

SEQ ID NO:	SEQ ID NO: in USSN 09/488,725	Accession No.	Species	Description	Smith - Waterman Score	% Identity
1	1000	gi7021484	Mus musculus	secretory carrier membrane protein 4	567	85
2	10017	R06463	Homo sapiens	Derived protein of clone ICA13 (ATCC 40553).	848	100
3	10020	gi1065967	Caenorhabditis elegans	similar to other protein phosphatases 1, 2A and 2B	325	36
4	10024	G03460	Homo sapiens	Human secreted protein,	439	98
5	10032	Y12505	Homo sapiens	Human 5' EST secreted protein	136	87
6	10042	Y29511	Homo sapiens	Human lung tumour protein SAL-25 1st predicted amino acid sequence.	701	100
7	1006	Y92324	Homo sapiens	Human alpha-2-delta-D polypeptide from splice variant 1.	763	100
8	10064	gi4589375	Homo sapiens	Gab2	425	58
9	1007	gi7018398	Homo sapiens		151	75
10	1008	gi896065	Homo sapiens	protein that is immuno-reactive with anti-PTH polyclonal antibodies	1226	99
11	10088	gi3779244	Homo sapiens	Metallo-protease 1	1512	98
12	10089	gi2947232	Homo sapiens	membrane associated guanylate kinase 2	523	100
13	10091	gi3347863	Mus musculus	cAMP-specific cyclic	223	54



SEQ ID NO:	SEQ ID NO: in USSN 09/48 8,725	Accession No.	Species	Description	Smith - Water man Score	% Identity
				nucleotide phosphodi- esterase PDE8; MMPDE8		
14	10098	gi69793 11	Homo sapiens	cysteine-rich repeat- containing protein S52 precursor	1068	100
15	10102	G01395	Homo sapiens	Human secreted protein,	297	88
16	10103	gi85473 3	Rattus norvegicus	casein kinase 1 gamma 1 isoform	293	84
17	10104	Y60017	Homo sapiens	Human endometrium tumour EST encoded protein 77.	154	100
18	10108	G03290	Homo sapiens	Human secreted protein,	215	97
19	10110	gi72922 99	Drosophila melanogaster	CG1271 gene product	208	46
20	10111	gi45123 34	Rattus norvegicus	Ca/calmodulin- dependent protein kinase kinase alpha, CaM-kinase kinase alpha	822	89
21	10113	Y41694	Homo sapiens	Human PRO382 protein sequence.	633	97
22	10114	gi34907 5	Rattus norvegicus	calmodulin- binding protein	531	99
23	10116	gi16298 1	Bos taurus	endozepine- related protein precursor	937	87
24	10121	gi89797 43	Canis familiaris	Band4.1-like5 protein	643	100
25	10126	Y99420	Homo sapiens	Human PRO1486 (UNQ755) amino acid sequence	607	100
26	1013	gi80475 0	Homo sapiens	protein tyrosine	614	73

SEQ ID NO:	SEQ ID NO: in USSN 09/488,725	Accession No.	Species	Description	Smith - Waterman Score	% Identity
				phosphatase		
27	10136	W02105	Homo sapiens	Human L-asparaginase.	1243	98
28	10142	Y35924	Homo sapiens	Extended human secreted protein sequence,	862	89
29	10148	gi3334982	Homo sapiens	R27216_1	329	98
30	1015	G02485	Homo sapiens	Human secreted protein,	120	72
31	10154	gi10798804	Homo sapiens	sperm antigen	2607	98
32	10175	Y96864	Homo sapiens	SEQ. ID. 37 from WO0034474.	536	100
33	10196	gi553621	Homo sapiens	profilaggrin	346	39
34	10198	gi1419016	Mus musculus	odorant receptor	281	53
35	10200	Y57903	Homo sapiens	Human transmembrane protein HTPN-27.	448	100
36	10208	gi4062492	Escherichia coli		505	100
37	10212	gi882529	Escherichia coli	ORF_f141	625	96
38	10213	gi4062778	Escherichia coli	Hypothetical protein HI0761	773	98
39	10214	gi6693832	Rattus norvegicus	opioid growth factor receptor	661	44
40	10227	G01360	Homo sapiens	Human secreted protein,	384	100
41	10236	gi1651257	Escherichia coli	.	373	100
42	10241	gi2769262	Escherichia coli	catabolite gene activator protein	178	96
43	10245	gi1789539	Escherichia coli	orf, hypothetical protein	679	98
44	10246	gi882492	Escherichia coli	ORF_o179	488	97
45	10247	gi1742149	Escherichia coli	Sn-glycerol-3-phosphate	323	100

SEQ ID NO:	SEQ ID NO: in USSN 09/488,725	Accession No.	Species	Description	Smith - Waterman Score	% Identity
				transport system permease protein UgpA.		
46	10282	Y29817	Homo sapiens	Human synapse related glycoprotein 2.	521	96
47	1031	gi6435130	Mus musculus	putative E1-E2 ATPase	990	86
48	1040	gi854124	Homo sapiens	Human giant larvae homologue	471	63
49	1043	gi3882285	Homo sapiens	KIAA0782 protein	154	61
50	1051	gi178216	Homo sapiens	anion exchange protein 1	172	100
51	1053	Y76748	Homo sapiens	Human protein kinase homologue, PKH-1.	180	92
52	1062	gi965014	Mus musculus	ADAM 4 protein precursor	492	65
53	1063	gi2393880	Drosophila melanogaster	A-kinase anchor protein DAKAP550	580	60
54	1066	gi2746788	Caenorhabditis elegans	contains similarity to transacylases	607	35
55	107	G00357	Homo sapiens	Human secreted protein,	183	77
56	1071	gi9105937	Xylella fastidiosa	Acetylglutamate kinase	505	36
57	1085	R95913	Homo sapiens	Neural thread protein.	257	55
58	1086	Y76332	Homo sapiens	Fragment of human secreted protein encoded by gene 38.	387	58
59	1088	gi4589642	Homo sapiens	KIAA0999 protein	873	99
60	109	gi763431	Homo sapiens	KIAA0999 protein	360	85
61	1095	Y94907	Homo sapiens	Human secreted	701	97

SEQ ID NO:	SEQ ID NO: in USSN 09/488,725	Accession No.	Species	Description	Smith - Waterman Score	% Identity
				protein clone cal06_19x protein sequence		
62	1102	Y07096	Homo sapiens	Colon cancer associated antigen precursor sequence.	1982	100
63	1105	Y84907	Homo sapiens	A human proliferation and apoptosis related protein.	983	91
64	1108	gi1398903	Mus musculus	Ca2+ dependent activator protein for secretion	1307	89
65	1109	Y91524	Homo sapiens	Human secreted protein sequence encoded by gene 74	2400	99
66	1113	gi1657462	Sus scrofa	calcium/calmodulin-dependent protein kinase II isoform gamma-E	1348	94
67	1117	Y32169	Homo sapiens	Human growth-associated protease inhibitor heavy chain precursor.	2831	97
68	1118	gi3063517	Homo sapiens		1138	98
69	1125	gi8248285	Homo sapiens	sphingosine kinase type 2 isoform	1290	98
70	1132	Y94918	Homo sapiens	Human secreted protein clone dd504_18 protein sequence	437	59
71	1143	gi45806	Homo sapiens	prepro-major	209	40

SEQ ID NO:	SEQ ID NO: in USSN 09/48 8,725	Access- ion No.	Species	Description	Smith - Water man Score	% Identity
		77		basic protein homolog		
72	1146	gi18239 5	Homo sapiens	focal adhesion kinase	131	87
73	1161	W90962	Homo sapiens	Human CSGP-2 protein.	931	100
74	117	W69428	Homo sapiens	Human secreted protein bp537_4.	159	93
75	1170	gi34339	Homo sapiens		586	87
76	1175	gi79602 43	Homo sapiens	SNARE protein kinase SNAK	308	100
77	118	gi53600 93	Homo sapiens	NY-REN-18 antigen	178	96
78	1183	gi29203 7	Homo sapiens	helix-loop- helix phosphoprotein	361	91
79	1193	gi18991 86	Rattus norvegicus	polysialyltran sferase	171	76
80	1195	gi13994 62	Homo sapiens	serine/threo- nine-protein kinase PRP4h	208	71
81	1198	gi18153 5	Homo sapiens	defensin precursor	150	71
82	1201	gi56689 35	Rattus norvegicus	plasma membrane Ca2+ ATPase isoform 1kb	244	73
83	1207	gi62248 68	Homo sapiens	TANK binding kinase TBK1	716	86
84	1210	gi17964 6	Homo sapiens	complement component C1s	242	61
85	1211	gi14831 87	Homo sapiens		296	65
86	1214	gi78006 38	Streptococcus pneumoniae	PspA	121	37
87	123	Y44810	Homo sapiens	Human Aspartic Protease-2 (NHAP-2).	218	93
88	1259	gi21166 72	Homo sapiens	EAR-1r	128	70
89	1266	gi72431 25	Homo sapiens	KIAA1372 protein	403	53
90	1270	gi12894 45	Homo sapiens	diacylglycerol kinase epsilon DGK	125	96

SEQ ID NO:	SEQ ID NO: in USSN 09/488,725	Accession No.	Species	Description	Smith - Waterman Score	% Identity
91	1290	gi1429371	Drosophila melanogaster	ubiquitin-specific protease	470	41
92	1291	Y66755	Homo sapiens	Membrane-bound protein PRO1185.	993	100
93	1296	gi9652087	Homo sapiens	scavenger receptor cysteine-rich type 1 protein M160 precursor	1183	99
94	1299	gi7300398	Drosophila melanogaster	CG7683 gene product	397	40
95	1317	gi3695115	Rattus norvegicus	CL1AA	216	100
96	132	gi187171	Homo sapiens	12-lipoxygenase	176	97
97	1330	Y12482	Homo sapiens	Human 5' EST secreted protein	65	44
98	1336	gi10798814	Homo sapiens	MLTK-beta	2366	99
99	135	gi456090	Homo sapiens	effector cell protease receptor 1	190	74
100	1356	gi193057	Mus musculus	envelope polyprotein precursor	131	36
101	1369	gi458657	Homo sapiens	glucocorticoid receptor alpha-2	596	89
102	1392	gi8493519	Mus musculus	nuclear localization signal binding protein	145	59
103	1408	gi3127051	Rattus norvegicus	potassium channel regulatory protein KChAP	176	84
104	141	gi6453613	Mus musculus	putative protein kinase	204	33
105	1424	gi2982501	Homo sapiens	neuropathy target esterase	769	100
106	143	W50033	Homo sapiens	Human immunity related factor.	1201	98
107	1431	gi10644	Heterodera	hypothetical	133	36

SEQ ID NO:	SEQ ID NO: in USSN 09/488,725	Accession No.	Species	Description	Smith - Waterman Score	% Identity
		565	glycines	esophageal gland cell secretory protein 10		
108	1441	gi3044086	Myxococcus xanthus	unknown	149	32
109	1444	gi7248381	Homo sapiens	adaptor protein p130Cas	1615	97
110	1447	Y65168	Homo sapiens	Human 5' EST related polypeptide	403	97
111	1457	W19919	Homo sapiens	Human Ksr-1 (kinase suppressor of Ras).	227	77
112	1471	G02532	Homo sapiens	Human secreted protein,	97	59
113	1473	gi6062874	Homo sapiens	candidate tumor suppressor protein DICE1	581	100
114	1474	Y64896	Homo sapiens	Human 5' EST related polypeptide	197	100
115	1483	gi436218	Homo sapiens	KIAA0037	295	76
116	1486	gi5852834	Homo sapiens	bridging integrator-2	133	64
117	149	gi3327162	Homo sapiens	KIAA0674 protein	2243	98
118	1503	gi1736785	Escherichia coli	.	1270	97
119	1506	gi4062298	Escherichia coli	YhhI protein	612	90
120	1513	gi4062346	Escherichia coli	.	556	94
121	1514	gi216609	Escherichia coli	PhoQ protein	661	90
122	1523	gi5712756	Rattus norvegicus	calcium transporter CaT1	1178	90
123	1527	gi1853980	Mus musculus	glucocorticoid receptor interacting protein 1	171	84
124	1536	Y17227	Homo sapiens	Human secreted	452	100

SEQ ID NO:	SEQ ID NO: in USSN 09/48 8,725	Accession No.	Species	Description	Smith - Water man Score	% Identity
				protein (clone yal-1).		
125	154	gi85150 90	Pinus taeda	putative arabinogalactan protein	81	40
126	1544	gi38799 33	Caenorhabditis elegans	Similarity to Xenopus F- spondin precursor (PIR Acc. No. comes from this gene	134	34
127	1554	gi65238 17	Homo sapiens	SlR protein	255	84
128	1555	gi66352 05	Homo sapiens	beta- ureidopropionase	210	90
129	1556	Y39286	Homo sapiens	Phosphodiesterase 10 (PDE10) clone FB93a.	161	61
130	1564	gi89779 45	Streptomyces coelicolor A3(2)	putative secreted serine protease	231	45
131	1576	gi30258 28	Rattus norvegicus	signal transducer and activator of transcription 4	183	97
132	1578	gi51065 72	Homo sapiens	transcriptional activator SRCAP	758	98
133	1579	gi85755 27	Homo sapiens	toll-like receptor 8	595	99
134	158	gi40605 8	Mus musculus	protein kinase	168	70
135	1580	gi63340	Gallus gallus	c-Rmil	231	90
136	1588	gi22179 31	Homo sapiens	PKU-alpha	127	92
137	1589	gil2724 22	Mus musculus	Phosphoinositide 3-kinase	720	99
138	159	gi22246 29	Homo sapiens	KIAA0344	215	43
139	1600	gi10160 12	Rattus norvegicus	neural cell adhesion protein BIG-2 precursor	543	93
140	161	gi66495 83	Homo sapiens	kidney and liver proline	1651	98



SEQ ID NO:	SEQ ID NO: in USSN 09/488,725	Accession No.	Species	Description	Smith - Waterman Score	% Identity
				oxidase 1		
141	1612	gi406113	Rattus norvegicus	protein kinase I	125	89
142	1615	gi219992	Homo sapiens	phSR2	150	78
143	1620	gi5714636	Homo sapiens	serine/threonine protein kinase Kp78 splice variant CTAK75a	126	71
144	1644	Y13352	Homo sapiens	Amino acid sequence of protein PRO228.	2542	100
145	1647	Y99444	Homo sapiens	Human PRO1575 (UNQ781) amino acid sequence	704	100
146	1650	gi3789765	Homo sapiens	transmembrane receptor UNC5C	271	100
147	1663	W75258	Homo sapiens	Fragment of human secreted protein encoded by gene 26.	163	96
148	1665	gi10432431	Homo sapiens	secreted modular calcium-binding protein	1428	99
149	1671	gi6708169	Mus musculus	inositol phosphatase eSHIPD183	169	97
150	1672	Y68773	Homo sapiens	Amino acid sequence of a human phosphorylation effector PHSP-5.	1030	99
151	1678	gi6063017	Homo sapiens	tousled-like kinase 1	132	86
152	1680	gi3510603	Homo sapiens	nuclear receptor co-repressor N-CoR	278	80
153	1692	gi1546084	Homo sapiens	farnesol receptor HRR-1	165	100
154	1698	gi520469	Oryctolagus cuniculus	597 aa protein related to	177	94

SEQ ID NO:	SEQ ID NO: in USSN 09/48 8,725	Accession No.	Species	Description	Smith - Water man Score	% Identity
				Na/glucose cotransporters		
155	1702	gi10432 382	Homo sapiens		519	95
156	1704	Y91668	Homo sapiens	Human secreted protein sequence encoded by gene 73	214	75
157	1708	gi30807 57	Mus musculus	growth factor independence- 1B	457	78
158	1716	gi29653	Homo sapiens	putative oncogene	220	92
159	173	gi34524 73	Rattus norvegicus	serine/threo- nine protein kinase TA01	699	100
160	1731	Y27581	Homo sapiens	Human secreted protein encoded by gene No. 15.	774	100
161	1732	gi96520 87	Homo sapiens	scavenger receptor cysteine-rich type 1 protein M160 precursor	1025	98
162	174	Y35923	Homo sapiens	Extended human secreted protein sequence,	1691	100
163	1740	Y53014	Homo sapiens	Human secreted protein clone fn189_13 protein sequence	337	60
164	1748	gi77702 37	Homo sapiens	PRO2822	218	93
165	1751	gi89798 25	Homo sapiens		306	50
166	1755	R95332	Homo sapiens	Tumor necrosis factor receptor 1 death domain ligand (clone	1184	62

SEQ ID NO:	SEQ ID NO: in USSN 09/488,725	Accession No.	Species	Description	Smith - Waterman Score	% Identity
				3TW) .		
167	1762	gi7380947	Homo sapiens	Gem-interacting protein	1545	99
168	1776	gi5912265	Homo sapiens	hypothetical protein	224	100
169	1777	Y70461	Homo sapiens	Human membrane channel protein-11 (MECHP-11) .	413	95
170	1781	R26060	Homo sapiens	Growth Factor Receptor Bound protein GRB-1.	398	98
171	1796	gi10312169	Homo sapiens	serine carboxypeptidase 1 precursor protein	1381	99
172	180	gi3002527	Homo sapiens	neuronal thread protein AD7c-NTP	477	61
173	182	gi7385131	Homo sapiens	HBV pX associated protein-8; XAP-8	2066	82
174	1820	G03249	Homo sapiens	Human secreted protein,	370	97
175	1822	gi473969	Oryctolagus cuniculus	one of the members of sodium-glucose cotransporter family	1048	90
176	1829	gi10440355	Homo sapiens	FLJ00012 protein	310	96
177	1832	gi165650	Oryctolagus cuniculus	phosphorylase kinase beta-subunit	146	96
178	1834	W75132	Homo sapiens	Human secreted protein encoded by gene 11 clone HCENJ40.	423	47
179	1837	gi60369	Saimiriine herpesvirus 2	ORF 48~EDLF5~sim. to EBV BRRF2	615	71

SEQ ID NO:	SEQ ID NO: in USSN 09/48 8,725	Access- sion No.	Species	Description	Smith - Water man Score	% Identity
180	1859	gi99896 96	Homo sapiens	ROR2 protein	645	87
181	1880	gi73408 47	Mus musculus	chondroitin 4- sulfotransfera se	275	40
182	1881	gi75732 91	Homo sapiens		298	100
183	1890	gi31499 50	Homo sapiens	ST1C2	183	94
184	1899	gi21432 60	Homo sapiens	Phosphoino- sitide 3- kinase	346	98
185	19	gi18085 82	Homo sapiens	U2AF1-RS2	224	46
186	192	G03192	Homo sapiens	Human secreted protein,	267	86
187	1922	gi48585 8	Mus musculus	IB3/5- polypeptide	1206	78
188	1945	gi37261	Homo sapiens		1402	97
189	195	W67863	Homo sapiens	Human secreted protein encoded by gene 57 clone HFEBF41.	551	98
190	1957	gi40673 8	Homo sapiens	Shb	263	44
191	1969	Y41701	Homo sapiens	Human PRO708 protein sequence.	975	98
192	1970	gi39798 17	Caenorhabditi s elegans	Weak similarity to Human tyrosine- protein kinase CSK	254	49
193	1973	G00796	Homo sapiens	Human secreted protein,	365	98
194	1985	gi45586 37	Homo sapiens	Putative homolog of hypoxia inducible factor three alpha	1420	99
195	1986	gi44550 15	Homo sapiens	host cell factor homolog	367	50

SEQ ID NO:	SEQ ID NO: in USSN 09/488,725	Accession No.	Species	Description	Smith - Waterman Score	% Identity
				LCP		
196	2	G02532	Homo sapiens	Human secreted protein,	106	85
197	2004	gi10503935	Homo sapiens	type A calpain-like protease	961	100
198	2023	gi1651341	Escherichia coli	.	1075	97
199	2025	Y71069	Homo sapiens	Human membrane transport protein, MTRP-14.	540	100
200	2038	gi8572543	Homo sapiens	membrane-associated lectin type-C	686	98
201	2041	gi37400	Homo sapiens	trk-2h polypeptide	228	89
202	2043	W75096	Homo sapiens	Human secreted protein encoded by gene 40 clone HNEDJ57.	290	38
203	2068	G03394	Homo sapiens	Human secreted protein,	595	97
204	2072	gi2116552	Rattus norvegicus	cationic amino acid transporter 3	1025	85
205	2076	gi157409	Drosophila melanogaster	fat protein	369	39
206	2078	gi1054940	Gallus gallus	cSH-PTP2	605	94
207	2084	gi9663128	Homo sapiens	hypothetical protein	874	99
208	2088	gi10567590	Homo sapiens	sodium bicarbonate cotransporter-like protein	609	100
209	2089	gi1789001	Escherichia coli	putative ATP-binding component of a transport system	961	98
210	2097	Y70460	Homo sapiens	Human membrane channel	258	96

SEQ ID NO:	SEQ ID NO: in USSN 09/48 8,725	Acces- sion No.	Species	Description	Smith - Water man Score	% Identity
				protein-10 (MECHP-10) .		
211	2108	gi32075 08	Rattus norvegicus	hexokinase	767	74
212	2111	gi63302 33	Homo sapiens	KIAA1176 protein	3710	99
213	2118	W74797	Homo sapiens	Human secreted protein encoded by gene 68 clone HKIXR69.	156	96
214	2134	gi17809 91	Homo sapiens	branched chain acyl-CoA oxidase	209	97
215	2146	gi76881 48	Homo sapiens	hypothetical protein	1038	100
216	2149	gi22804 85	Homo sapiens	KIAA0376	917	100
217	2153	gi18424 29	Rattus norvegicus	ankyrin binding cell adhesion molecule neurofascin	592	88
218	2155	gi65267 91	Homo sapiens	Eps15R	1126	100
219	2161	gi73004 27	Drosophila melanogaster	CG7709 gene product	200	33
220	2163	Y52296	Homo sapiens	Human isomerase homologue-3 (HIH-3) .	186	91
221	2173	W34526	Homo sapiens	hTCP protein fragment.	164	93
222	2178	gi33605 12	Rattus norvegicus	Citron-K kinase	299	94
223	2180	Y74008	Homo sapiens	Human prostate tumor EST fragment derived protein #195.	261	41
224	2184	gi53041	Mus musculus		130	41
225	2186	gi40177 4	Homo sapiens	ribosomal protein S6 kinase 3	142	64
226	2190	gi57729 5	Homo sapiens	The ha1225 gene product is related to human alpha-	176	100

SEQ ID NO:	SEQ ID NO: in USSN 09/488,725	Accession No.	Species	Description	Smith - Waterman Score	% Identity
				glucosidase.		
227	2210	gi2055392	Rattus norvegicus	transmembrane receptor UNC5H1	620	90
228	2214	gi7861733	Homo sapiens	low density lipoprotein receptor related protein-deleted in tumor	1360	98
229	2223	gi7959189	Homo sapiens	KIAA1464 protein	884	99
230	223	W88627	Homo sapiens	Secreted protein encoded by gene 94 clone HPMBQ32.	300	77
231	2233	gi7839587	Homo sapiens	organic anion transporting polypeptide 14	1092	99
232	2237	gi10440400	Homo sapiens	FLJ00033 protein	1212	99
233	2251	gi5923786	Homo sapiens	zinc metallo-protease ADAMTS6	277	44
234	2256	W63698	Homo sapiens	Human secreted protein 18.	516	100
235	2259	gi4678722	Homo sapiens	hypothetical protein	387	36
236	2262	Y33741	Homo sapiens	Beta-secretase.	793	99
237	2265	gi7018545	Homo sapiens	hypothetical protein	608	94
238	2271	gi4186183	Homo sapiens	unknown	684	53
239	2273	gi7243035	Homo sapiens	KIAA1327 protein	1031	100
240	2280	gi5809678	Homo sapiens	sperm membrane protein BS-63	342	95
241	2286	gi6224691	Homo sapiens	Na <sup>+</sup> /sulfate cotransporter SUT-1	1221	99
242	2291	gi207621	Rattus norvegicus	uromodulin	345	50
243	2292	gi7296304	Drosophila melanogaster	CG5274 gene product	272	35
244	2294	Y28503	Homo sapiens	HGFH3 Human Growth Factor	320	98

SEQ ID NO:	SEQ ID NO: in USSN 09/488,725	Accession No.	Species	Description	Smith - Waterman Score	% Identity
				Homologue 3.		
245	2296	W88799	Homo sapiens	Polypeptide fragment encoded by gene 45.	223	86
246	2303	gi7110160	Homo sapiens	guanine nucleotide exchange factor	1212	99
247	2306	gi6434874	Mus musculus	calcium/calmodulin dependent protein kinase kinase alpha	576	84
248	2309	Y95433	Homo sapiens	Human calcium channel SOC-2/CRAC-1 C-terminal polypeptide.	1203	99
249	2313	gi7300943	Drosophila melanogaster	CG4677 gene product	689	79
250	2318	W48351	Homo sapiens	Human breast cancer related protein BCRB2.	202	59
251	2329	G01772	Homo sapiens	Human secreted protein,	311	84
252	2330	Y41729	Homo sapiens	Human PRO1071 protein sequence.	886	99
253	2342	gi3786430	Caenorhabditis elegans		268	42
254	2350	gi930104	Homo sapiens	protein-tyrosine phosphatase	571	79
255	2359	gi9392591	Homo sapiens	CC chemokine CCL28	679	99
256	2361	gi1666689	Mus musculus	alpha-NAC, muscle-specific form gp220	357	41
257	2374	G03172	Homo sapiens	Human secreted protein,	112	78
258	2387	gi1399197	Homo sapiens	pyruvate dehydrogenase kinase isoform 4	201	85
259	2401	G01757	Homo sapiens	Human	612	99



SEQ ID NO:	SEQ ID NO: in USSN 09/48 8,725	Accession No.	Species	Description	Smith - Waterman Score	% Identity
				secreted protein,		
260	2409	gi181123	Homo sapiens	cleavage signal 1 protein	194	86
261	2431	gi7018547	Homo sapiens	hypothetical protein	473	50
262	2432	gi4826496	Homo sapiens		327	39
263	2467	G03667	Homo sapiens	Human secreted protein,	640	97
264	2471	gi7688148	Homo sapiens	hypothetical protein	1284	91
265	2478	gi790819	Homo sapiens	polycystic kidney disease-associated protein	615	90
266	2484	gi3327080	Homo sapiens	KIAA0633 protein	1747	99
267	249	G03793	Homo sapiens	Human secreted protein,	139	65
268	2490	gi6467371	Homo sapiens	thyrotropin-releasing hormone degrading ectoenzyme	757	98
269	25	G03203	Homo sapiens	Human secreted protein,	137	65
270	2504	gi4097712	Homo sapiens	HBV associated factor	166	74
271	2506	gi2072784	Homo sapiens	Na <sup>+</sup> /nucleoside cotransporter	201	95
272	2507	gi5924007	Homo sapiens		335	38
273	2510	gi7717385	Homo sapiens	beta-site APP-cleaving enzyme 2, EC 3.4.23.	383	89
274	2523	gi339709	Homo sapiens		150	96
275	253	gi36615	Homo sapiens	serine/threonine protein kinase	391	77
276	2533	gi45896	Homo sapiens	KIAA0985	191	61

SEQ ID NO:	SEQ ID NO: in USSN 09/488,725	Accession No.	Species	Description	Smith - Waterman Score	% Identity
		14		protein		
277	2536	gi2088685	Caenorhabditis elegans	strong similarity to the CDC2/CDX subfamily of ser/thr protein kinases	419	55
278	2544	gi1002425	Mus musculus	YSPL-1 form 2	280	80
279	2568	Y41738	Homo sapiens	Human PRO541 protein sequence.	379	49
280	2580	gi3004482	Rattus norvegicus	putative integral membrane transport protein	382	49
281	2593	gi7300049	Drosophila melanogaster	CG4525 gene product	582	50
282	2600	gi4530437	Homo sapiens	thyroid hormone receptor-associated protein complex component TRAP240	334	90
283	2625	gi8099652	Homo sapiens	toll-like receptor 9 form A	761	96
284	2641	gi148019	Escherichia coli	tolA	692	100
285	2667	gi1750387	Pseudomonas aeruginosa	Carbamoyl-phosphate synthetase large subunit	143	76
286	2670	gi4883437	Mus musculus	RNA binding protein	139	92
287	2673	Y66656	Homo sapiens	Membrane-bound protein PRO943.	1869	98
288	2676	gi3885978	Mus musculus	mismatch-specific thymine-DNA glycosylate	123	88
289	2680	gi6453438	Homo sapiens	hypothetical protein	465	82
290	2682	gi18417	Mus musculus	GATA-5	527	77

SEQ ID NO:	SEQ ID NO: in USSN 09/48 8,725	Accession No.	Species	Description	Smith - Waterman Score	% Identity
		56		cardiac transcription factor		
291	2684	gi98449 20	Homo sapiens	nicotinic acetylcholine receptor subunit alpha 10	294	88
292	2695	gi17897 64	Escherichia coli	putative transport	879	98
293	2697	gi34922 9	Escherichia coli	peripheral membrane protein	936	99
294	2698	gi40621 94	Escherichia coli	.	737	100
295	2700	gi52924 0	Escherichia coli	homoserine kinase	578	100
296	2704	gi15528 31	Escherichia coli	hypothetical	420	100
297	2712	gi17896 72	Escherichia coli	putative ATP- binding component of a transport system	262	100
298	2716	gi40624 09	Escherichia coli	Transmembrane protein dppC	382	100
299	2719	gi30497 6	Escherichia coli	matches PS00017: ATP_GTP_A and PS00301: EFACTOR_GTP; similar	921	95
300	2724	gi14585 6	Escherichia coli	nmpC	647	97
301	2725	gi17894 73	Escherichia coli	putative transport protein	312	100
302	2728	gi18055 61	Escherichia coli		222	97
303	2729	gi43248	Escherichia coli		655	91
304	2744	gi39629 9	Escherichia coli	similar to E. coli pyruvate formate-lyase activating enzyme	675	100
305	2749	gi17426 48	Escherichia coli	.	592	100
306	2752	gi40622	Escherichia	Sensor kinase	357	100

SEQ ID NO:	SEQ ID NO: in USSN 09/488,725	Accession No.	Species	Description	Smith - Waterman Score	% Identity
		36	coli	CitA		
307	2762	gi1787795	Escherichia coli	putative LACI-type transcriptional regulator	342	100
308	2764	gi1799743	Escherichia coli	putative LACI-type transcriptional regulator	151	84
309	2768	gi405964	Escherichia coli	yohG	534	94
310	2774	gi4062338	Escherichia coli	.	387	97
311	2790	gi4062338	Escherichia coli	.	420	86
312	2800	gi1789805	Escherichia coli	putative transport	572	100
313	2811	gi5305333	Mus musculus	protein kinase Myak-S	421	49
314	2827	gi10047251	Homo sapiens	KIAA1588 protein	531	97
315	2830	G02872	Homo sapiens	Human secreted protein,	185	62
316	2836	gi191175	Cricetulus sp.	CAMP-dependent protein kinase alpha-catalytic subunit	1677	97
317	2851	gi558846	Homo sapiens	BCL2/adeno-virus E1B 19kD-interacting protein 3	220	61
318	2856	gi3882211	Homo sapiens	KIAA0745 protein	232	93
319	2866	gi6329708	Homo sapiens	KIAA1119 protein	1331	91
320	2874	gi2853033	Mus musculus	tousled-like kinase	203	82
321	2882	gi10185134	Schizosaccharomyces pombe	hypothetical zinc-finger protein	318	42
322	2886	G03797	Homo sapiens	Human secreted protein,	140	69
323	2899	gi4240325	Homo sapiens	KIAA0918 protein	170	53

SEQ ID NO:	SEQ ID NO: in USSN 09/488,725	Accession No.	Species	Description	Smith - Waterman Score	% Identity
324	2906	Y94988	Homo sapiens	Human secreted protein vl1_1,	1738	100
325	2920	gi9453735	Homo sapiens		1926	100
326	2925	gi6434876	Homo sapiens	CDK4-binding protein p34SEI1	1210	100
327	2930	gi3941320	Schistosoma japonicum	myosin	208	28
328	2934	Y31645	Homo sapiens	Human transport-associated protein-7 (TRANP-7).	642	63
329	2955	G01165	Homo sapiens	Human secreted protein,	528	99
330	2967	gi7263960	Homo sapiens		466	100
331	2980	gi4589530	Homo sapiens	KIAA0943 protein	1849	94
332	2994	G03812	Homo sapiens	Human secreted protein,	124	61
333	2996	gi9857400	Homo sapiens	tumor endothelial marker 1 precursor	2666	98
334	2999	Y66697	Homo sapiens	Membrane-bound protein PRO1383.	2254	100
335	3	gi6289072	Homo sapiens	JM24 protein	930	100
336	3008	Y45219	Homo sapiens	Human CASB47 protein.	557	92
337	3013	gi5262678	Homo sapiens	hypothetical protein	1747	100
338	3041	Y73335	Homo sapiens	HTRM clone 1850120 protein sequence.	1315	99
339	306	gi4868443	Mesocricetus auratus	Mx-interacting protein kinase PKM	1867	95
340	3061	gi433338	Homo sapiens	protein-tyrosine kinase	3934	94

SEQ ID NO:	SEQ ID NO: in USSN 09/488,725	Accession No.	Species	Description	Smith - Waterman Score	% Identity
341	309	Y76145	Homo sapiens	Human secreted protein encoded by gene 22.	1313	99
342	3095	gi7300159	Drosophila melanogaster	CG14899 gene product	190	57
343	3098	gi532056	Homo sapiens	protein-tyrosine-phosphatase	2641	86
344	3105	gi285987	Homo sapiens	mitochondrial outer membrane protein 19	192	71
345	3118	gi9929935	Macaca fascicularis	hypothetical protein	180	61
346	3124	gi8131903	Mus musculus	transient receptor potential-related protein	226	100
347	3126	Y02370	Homo sapiens	Polypeptide identified by the signal sequence trap method.	261	100
348	3166	gi7290860	Drosophila melanogaster	CG1531 gene product	534	42
349	3175	gi6649583	Homo sapiens	kidney and liver proline oxidase 1	1752	95
350	3176	gi7208438	Homo sapiens	long-chain 2-hydroxy acid oxidase HAOX2	1048	95
351	3188	Y02693	Homo sapiens	Human secreted protein encoded by gene 44 clone HTDAD22.	243	57
352	3191	gi7105926	Homo sapiens	calcium channel alpha2-delta3 subunit	300	96
353	3208	gi10334774	Homo sapiens	MUCDHL-FL	613	98
354	3226	Y87209	Homo sapiens	Human secreted protein sequence	3147	99

SEQ ID NO:	SEQ ID NO: in USSN 09/488,725	Accession No.	Species	Description	Smith - Waterman Score	% Identity
355	3235	gi6715135	Homo sapiens	Fanconi anemia, complementation group F	1947	99
356	3257	gi5441615	Canis familiaris	zinc finger protein	326	42
357	3282	G03002	Homo sapiens	Human secreted protein,	211	61
358	3289	gi3288457	Homo sapiens	PI3-kinase	5832	97
359	3296	gi7770139	Homo sapiens	PRO1722	293	64
360	3298	gi2198815	Ambystoma tigrinum	electrogenic Na <sup>+</sup> bicarbonate cotransporter; NBC	1278	52
361	3303	gi4028015	Homo sapiens	potassium channel	1881	92
362	3305	gi5902966	Homo sapiens	very large G-protein coupled receptor-1	1770	100
363	3308	gi219944	Homo sapiens	The first in-frame ATG codon is located at nucleotides NPPase.	3967	86
364	3325	gi3510234	Homo sapiens	R31237_1, partial CDS	192	94
365	3341	W78899	Homo sapiens	Human UNC-5 homologue UNC5H-1.	1614	90
366	3342	gi1478205	Mus musculus	PNG protein	341	70
367	3350	gi2739460	Bos taurus	regulator of G-protein signaling 7	2263	98
368	3372	gi7671663	Homo sapiens		375	79
369	338	Y84322	Homo sapiens	A human cardiovascular system associated protein kinase-3.	2606	100
370	3383	gi10441	Homo sapiens	protein	1127	100

SEQ ID NO:	SEQ ID NO: in USSN 09/48 8,725	Accession No.	Species	Description	Smith - Waterman Score	% Identity
		382		kinase		
371	3395	gi530823	Homo sapiens	epidermal growth factor receptor kinase substrate	402	47
372	3405	Y29332	Homo sapiens	Human secreted protein clone pe584_2 protein sequence.	1220	94
373	3408	gi3334741	Homo sapiens	shal-type potassium channel	2888	90
374	345	gi4539527	Homo sapiens	NAALADase L protein	600	72
375	346	Y95434	Homo sapiens	Human calcium channel SOC-3/CRAC-2 C-terminal polypeptide.	1802	99
376	3470	gi9798452	Homo sapiens	putative capacitative calcium channel	277	100
377	3482	gi3818572	Homo sapiens	cAMP-specific phosphodiesterase 8B; PDE8B1; 3',5'-cyclic nucleotide phosphodiesterase	2353	96
378	3492	gi1665825	Homo sapiens		3878	99
379	3530	gi505100	Homo sapiens	KIAA0066	3637	100
380	3533	Y32169	Homo sapiens	Human growth-associated protease inhibitor heavy chain precursor.	2860	99
381	3545	gi6624133	Homo sapiens		449	98
382	3549	gi1469193	Homo sapiens	The KIAA0135 gene is related to	5374	99



SEQ ID NO:	SEQ ID NO: in USSN 09/488,725	Accession No.	Species	Description	Smith - Waterman Score	% Identity
				pim-1 oncogene.		
383	3595	gi6330190	Homo sapiens	KIAA1169 protein	1893	100
384	3601	gi808915	Homo sapiens	tumor necrosis factor receptor type 1 associated protein	992	99
385	3612	gi5305448	Mus musculus	SH2-B PH domain containing signaling mediator 1 gamma isoform	1439	92
386	3613	Y32194	Homo sapiens	Human receptor molecule (REC) encoded by Incyte clone 266775.	1438	100
387	3621	gi897849	Mus musculus	ubiquitinating enzyme E2-230 kDa	393	68
388	3624	R47858	Homo sapiens	Human LDL receptor Domains 1 and 2.	2895	100
389	3625	Y57949	Homo sapiens	Human transmembrane protein HTMPN-73.	1868	100
390	3626	W69342	Homo sapiens	Secreted protein of clone CJ424_9.	442	94
391	3627	gi6537136	Homo sapiens	putative organic anion transporter	982	92
392	3630	Y06886	Homo sapiens	HWHHJ20 polypeptide.	1109	91
393	3642	gi4886467	Homo sapiens	hypothetical protein	570	52
394	3645	gi9588402	Homo sapiens		598	98
395	3647	Y12050	Homo sapiens	Human 5' EST secreted protein	517	98

SEQ ID NO:	SEQ ID NO: in USSN 09/48 8,725	Accession No.	Species	Description	Smith - Waterman Score	% Identity
396	3653	Y70018	Homo sapiens	Human Protease and associated protein-12 (PPRG-12).	2232	99
397	3676	W67818	Homo sapiens	Human secreted protein encoded by gene 12 clone HMSJJ74.	338	100
398	3677	gi32093	Homo sapiens	HGMP07J	650	52
399	3681	Y48443	Homo sapiens	Human prostate cancer- associated protein 140.	803	93
400	3682	gi46917 26	Homo sapiens	ARF GTPase- activating protein GIT1	2435	91
401	3688	gi66938 24	Homo sapiens	ubiquitin- specific protease	1995	99
402	3689	Y94927	Homo sapiens	Human secreted protein clone ck213_12 protein sequence	530	81
403	3690	gi18716 12	Oryctolagus cuniculus	ryanodine receptor	594	95
404	3706	gi60027 14	Homo sapiens	membrane-type serine protease 1	2630	94
405	3714	gi26957 08	Homo sapiens	SPOP	553	81
406	3720	gi93092 93	Homo sapiens	asc-type amino acid transporter 1	566	95
407	3726	gi10440 381	Homo sapiens	FLJ00026 protein	1023	69
408	373	gi57146 96	Mus musculus	alpha 2 delta calcium channel subunit	243	95
409	3788	gi69112 19	Homo sapiens	type II membrane serine protease	841	100

SEQ ID NO:	SEQ ID NO: in USSN 09/488,725	Accession No.	Species	Description	Smith - Waterman Score	% Identity
410	3789	Y45023	Homo sapiens	Human sensory transduction G-protein coupled receptor-B3.	1084	95
411	3790	gi1524088	Homo sapiens	Polio virus receptor protein	1508	99
412	3801	gi6723675	Homo sapiens	mitotic kinase-like protein-1	2035	99
413	3803	gi968973	Homo sapiens	mitotic kinase-like protein-1	332	86
414	3820	gi1770478	Homo sapiens	NK receptor	1988	99
415	3831	gi2781386	Homo sapiens		1493	99
416	3837	gi9367840	Homo sapiens	neuronal apoptosis inhibitory protein 2	2243	99
417	385	gi1526978	Homo sapiens	ryanodine receptor 2	149	96
418	3856	gi995654	Homo sapiens	interleukin-11 receptor	147	100
419	386	gi4960038	Mus musculus	T2K protein kinase homolog	669	66
420	3861	Y74129	Homo sapiens	Human prostate tumor EST fragment derived protein #316.	842	98
421	3883	gi6635205	Homo sapiens	beta-ureidopropionase	1576	100
422	3898	gi37231	Homo sapiens	DNA topoisomerase II	8436	99
423	3921	gi8648881	Homo sapiens	putative organic anion transporter	131	100
424	3932	gi8575775	Homo sapiens	KRAB zinc finger protein	1935	99
425	3934	gi4689128	Homo sapiens	SIH003	127	92
426	3963	gi3212996	Homo sapiens		339	64
427	3974	G03790	Homo sapiens	Human	232	63

SEQ ID NO:	SEQ ID NO: in USSN 09/488,725	Accession No.	Species	Description	Smith - Waterman Score	% Identity
				secreted protein,		
428	3983	gi181971	Homo sapiens	vascular endothelial growth factor	433	85
429	3999	gi1657464	Sus scrofa	calcium/calmodulin-dependent protein kinase II isoform gamma-G	484	75
430	4001	gi6572230	Homo sapiens		329	100
431	4009	gi2143260	Homo sapiens	phosphoinositide 3-kinase	521	99
432	401	gi6572379	Homo sapiens		1372	56
433	4020	gi2815624	Homo sapiens	tumor necrosis factor superfamily member LIGHT	1252	100
434	4024	Y21166	Homo sapiens	Human bcl2 proto-oncogene mutant protein fragment 14.	84	40
435	4040	Y57285	Homo sapiens	Human GPCR protein (HGPRP) sequence (clone ID 2214673).	1726	99
436	4057	W74873	Homo sapiens	Human secreted protein encoded by gene 145 clone HFXHL79.	531	100
437	4066	G03714	Homo sapiens	Human secreted protein,	92	70
438	4067	gi8331760	Homo sapiens	LU1 protein	1077	92
439	4078	Y57900	Homo sapiens	Human transmembrane protein HTMPN-24.	996	100
440	4120	gi18715	Homo sapiens	mitogen-	927	100

SEQ ID NO:	SEQ ID NO: in USSN 09/488,725	Accession No.	Species	Description	Smith - Waterman Score	% Identity
		39		activated protein kinase phosphatase 4		
441	4123	gi5360125	Homo sapiens	NY-REN-58 antigen	140	100
442	4130	gi6289072	Homo sapiens	JM24 protein	604	100
443	4133	gi8575527	Homo sapiens	toll-like receptor 8	755	100
444	4166	gi6118555	Homo sapiens	DEAD-box protein abstrakt	2512	100
445	4167	gi3800830	Rattus norvegicus	putative four repeat ion channel	615	93
446	4172	gi7209676	Homo sapiens	potassium channel Kv8.1	369	100
447	4185	gi5305405	Homo sapiens	Na <sup>+</sup> /H <sup>+</sup> exchanger isoform 2	1769	100
448	4197	gi2811122	Xenopus laevis	NaDC-2	524	69
449	4203	Q89840_aa1	Homo sapiens	Human death associated protein DAP-3.	198	97
450	4262	gi5901478	Marmota marmota	olfactory receptor	209	92
451	4276	gi32456	Homo sapiens	protein-tyrosine phosphatase	3270	99
452	4283	R41231	Homo sapiens	GAT-2 transporter gene.	477	100
453	4331	gi3171912	Homo sapiens	RAMP2	443	98
454	4340	gi8118223	Homo sapiens	unknown	1330	100
455	4351	gi1754515	Rattus norvegicus	aminopeptidase -B	2050	92
456	4354	Y57906	Homo sapiens	Human transmembrane protein HTMPN-30.	1402	100
457	4385	gi5596433	Homo sapiens	candidate tumor suppressor protein NOC2	509	97

SEQ ID NO:	SEQ ID NO: in USSN 09/488,725	Accession No.	Species	Description	Smith - Waterman Score	% Identity
458	4388	W78140	Homo sapiens	Human secreted protein encoded by gene 15 clone HSDES04.	100	94
459	4405	Y48226	Homo sapiens	Human prostate cancer-associated protein 12.	1246	99
460	441	gi291536	Bovine herpesvirus 1	BICP4	106	35
461	4417	gi6562533	Homo sapiens	sialin	939	100
462	4419	gi1841555	Homo sapiens	NG5	146	33
463	4443	gi496139	Mus musculus	AMPA selective glutamate receptor	262	94
464	4470	gi7248381	Homo sapiens	adaptor protein p130Cas	2592	100
465	4482	gi7329979	Homo sapiens	apoptosis regulator	2071	100
466	4487	gi6706659	Homo sapiens		405	100
467	4491	gi9837341	Homo sapiens	CamKI-like protein kinase	1044	100
468	4492	Y42751	Homo sapiens	Human calcium binding protein 2 (CaBP-2).	586	99
469	4497	gi6179740	Homo sapiens	paraneoplastic cancer-testis-brain antigen	352	37
470	4502	gi6329742	Homo sapiens	KIAA1124 protein	327	100
471	4519	Y99426	Homo sapiens	Human PRO1604 (UNQ785) amino acid sequence	1563	100
472	4526	Y08008	Homo sapiens	Human HLIG-1 protein.	4023	99
473	4547	gi4589562	Homo sapiens	KIAA0959 protein	4165	99
474	4554	gi1381029	Mus musculus		1164	77

SEQ ID NO:	SEQ ID NO: in USSN 09/48 8,725	Accession No.	Species	Description	Smith - Waterman Score	% Identity
475	4555	gi2792366	Homo sapiens	unknown protein IT12	4461	99
476	457	Y70551	Homo sapiens	Human latent transforming growth factor-beta binding protein 3 (I).	1825	100
477	4571	gi5360115	Homo sapiens	NY-REN-45 antigen	869	100
478	4613	Y05868	Homo sapiens	Human Toll protein PRO358.	2413	100
479	4614	Y27129	Homo sapiens	Human bone marrow-derived polypeptide (clone OAF038-Leu).	1815	100
480	4622	G03789	Homo sapiens	Human secreted protein,	173	53
481	4667	gi7673638	Danio rerio	Dedd1	446	48
482	4670	gi402649	Homo sapiens	c-rel	2309	100
483	4683	Y68773	Homo sapiens	Amino acid sequence of a human phosphorylation effector PHSP-5.	2234	99
484	4698	Y73470	Homo sapiens	Human secreted protein clone yd141_1 protein sequence	746	100
485	4724	gi6456846	Homo sapiens	hypothetical protein	1101	99
486	4734	gi3334982	Homo sapiens	R27216_1	1151	80
487	4814	gi6274473	Homo sapiens	pregnancy-induced growth inhibitor	1348	100
488	4819	Y07825	Homo sapiens	Human secreted protein fragment #4 encoded from	117	67

SEQ ID NO:	SEQ ID NO: in USSN 09/488,725	Accession No.	Species	Description	Smith - Waterman Score	% Identity
				gene 28.		
489	4821	Y81498	Homo sapiens	Human foetal bone-derived growth factor-like protein.	1200	100
490	4851	gi5689491	Homo sapiens	KIAA1077 protein	4364	99
491	4872	gi5911953	Homo sapiens	hypothetical protein	3723	99
492	4902	B08917	Homo sapiens	Human secreted protein sequence encoded by gene 27	717	100
493	5006	gi435774	Homo sapiens	receptor tyrosine kinase isoform FLT4 long, FLT41 {C-terminal}	385	100
494	5007	Y93951	Homo sapiens	Amino acid sequence of a Brainiac-5 polypeptide.	804	100
495	5027	gi3548791	Homo sapiens	R33590_1	1606	100
496	5029	gi5689527	Homo sapiens	KIAA1095 protein	5722	99
497	5033	Y14482	Homo sapiens	Fragment of human secreted protein encoded by gene 17.	166	66
498	5040	Y95019	Homo sapiens	Human secreted protein vq1_1,	258	92
499	5061	gi1304434	Pseudorabies virus	EP0	85	38
500	5081	gi4038081	Homo sapiens	vascular endothelial cell growth inhibitor	134	100
501	5129	gi3169158	Homo sapiens	BC269730_2	2340	99
502	5139	gi4062856	Homo sapiens	HEXIM1 protein	293	47
503	5174	gi93685	Homo sapiens	140up gene	576	90



SEQ ID NO:	SEQ ID NO: in USSN 09/488,725	Accession No.	Species	Description	Smith - Waterman Score	% Identity
		40		product		
504	524	G00329	Homo sapiens	Human secreted protein,	565	100
505	5291	Y92515	Homo sapiens	Human OXRE-12.	1271	98
506	5335	gi7296158	Drosophila melanogaster	CG3862 gene product	753	46
507	5346	Y94987	Homo sapiens	Human secreted protein vj1_1,	849	100
508	5379	gi7144506	Homo sapiens	cytokine-inducible SH2-containing protein	1353	99
509	5441	gi8096551	Homo sapiens	similar to mouse Ehm2	1516	100
510	549	Y22113	Homo sapiens	Human ZSMF-3 protein sequence.	294	62
511	5542	Y76267	Homo sapiens	Fragment of human secreted protein encoded by gene 11.	1066	100
512	5560	G03790	Homo sapiens	Human secreted protein,	103	36
513	5696	gi7920398	Homo sapiens	PTOV1	1904	91
514	5704	B08930	Homo sapiens	Human secreted protein sequence encoded by gene 2	987	100
515	5758	W18878	Homo sapiens	Human protein kinase C inhibitor, IPKC-1.	368	100
516	5760	gi6562176	Homo sapiens	hypothetical protein	425	100
517	5763	Y41706	Homo sapiens	Human PRO381 protein sequence.	441	100
518	5787	Y57907	Homo sapiens	Human transmembrane protein HTPN-31.	952	100

SEQ ID NO:	SEQ ID NO: in USSN 09/48 8,725	Accession No.	Species	Description	Smith - Water man Score	% Identity
519	5823	gi98002 42	rat cytomegalovir us Maastricht	pr5	153	36
520	5886	gi17810 37	Mus musculus	neuronal tyrosine threonine phosphatase 1	1135	52
521	5924	W69221	Homo sapiens	Human parotid secretory protein.	710	96
522	5960	Y91529	Homo sapiens	Human secreted protein sequence encoded by gene 79	1300	99
523	5962	W69784	Homo sapiens	Protein Kinase C Inhibitor-like Protein (IPKC-2).	395	100
524	5969	Y79141	Homo sapiens	Human haemopoietic stem cell regulatory protein SCM113.	1205	79
525	5976	gi78031 0	Homo sapiens	natural killer associated transcript 4	1808	91
526	6002	gi21045 53	Homo sapiens		4367	67
527	6008	Y66765	Homo sapiens	Membrane- bound protein PRO1384.	822	100
528	6020	gi19115 48	Homo sapiens	cytochrome c- like polypeptide	322	50
529	6036	W71362	Homo sapiens	Human cytokine/steroid receptor protein.	353	51
530	6070	Y42750	Homo sapiens	Human calcium binding protein 1 (CaBP-1).	626	100
531	6075	gi10732 648	Homo sapiens	angiopoietin- like protein	2164	100

SEQ ID NO:	SEQ ID NO: in USSN 09/488,725	Accession No.	Species	Description	Smith - Waterman Score	% Identity
				PP1158		
532	6106	gi2217970	Homo sapiens	p40	1349	96
533	6420	W82000	Homo sapiens	Human adult brain secreted protein dm26_2.	929	100
534	6434	gi10732648	Homo sapiens	angiopoietin-like protein PP1158	2164	100
535	6439	gi189701	Homo sapiens	endothelial cell growth factor	376	100
536	6463	Y41720	Homo sapiens	Human PRO792 protein sequence.	360	82
537	6466	gi4884084	Homo sapiens	hypothetical protein	538	100
538	6508	gi5442030	Homo sapiens	aminopeptidase	2317	96
539	6570	gi5921491	Homo sapiens		1591	99
540	6719	gi31847	Homo sapiens	glypican	1625	87
541	6772	Y65432	Homo sapiens	Human 5' EST related polypeptide	180	53
542	6789	gi537292	Homo sapiens	ICH-1L	1556	100
543	6805	gi4454702	Homo sapiens	HSPC007	634	84
544	6833	gi1890660	Homo sapiens	protein tyrosine phosphatase receptor omicron	5726	87
545	6834	gi5921491	Homo sapiens		1746	88
546	6851	gi2407641	Homo sapiens	neuropilin	3968	98
547	6868	gi6714641	Drosophila melanogaster	MAP kinase phosphatase	218	49
548	6876	Y13138	Homo sapiens	Human secreted protein encoded by 5' EST	414	76
549	688	Y73463	Homo sapiens	Human secreted protein clone	701	98

SEQ ID NO:	SEQ ID NO: in USSN 09/488,725	Accession No.	Species	Description	Smith - Waterman Score	% Identity
				yk199_1 protein sequence		
550	6897	gi5815180	Homo sapiens	unknown	509	97
551	690	gi10645186	Homo sapiens	meningioma-expressed antigen 5s splice variant	522	100
552	6909	W78149	Homo sapiens	Human secreted protein encoded by gene 24 clone HSVBF78.	485	100
553	6924	Y35923	Homo sapiens	Extended human secreted protein sequence,	514	99
554	6937	G03798	Homo sapiens	Human secreted protein,	281	70
555	6951	gi511857	Homo sapiens	prostate-specific antigen	364	95
556	7008	G03200	Homo sapiens	Human secreted protein,	548	98
557	7009	Y22213	Homo sapiens	Human V201 protein sequence.	856	100
558	7057	gi6003654	Homo sapiens	brain specific membrane-anchored protein BSMAP	1814	100
559	7098	W27291	Homo sapiens	Human H1075-1 secreted protein 5' end.	712	100
560	7114	gi3212110	Homo sapiens	prefoldin subunit 1	534	98
561	712	gi4558641	Homo sapiens	P85B_HUMAN; PTDINS-3-KINASE P85-BETA	470	74
562	7215	gi4868366	Homo sapiens	delta-6 fatty acid desaturase	2437	100

SEQ ID NO:	SEQ ID NO: in USSN 09/488,725	Accession No.	Species	Description	Smith - Waterman Score	% Identity
563	7244	Y12445	Homo sapiens	Human 5' EST secreted protein	428	100
564	7248	gi311376	Homo sapiens	Humig	633	100
565	7252	gi5689531	Homo sapiens	KIAA1097 protein	5240	100
566	7292	gi5106998	Homo sapiens	HSPC040 protein	580	100
567	7306	Y32201	Homo sapiens	Human receptor molecule (REC) encoded by Incyte clone 2057886.	1974	95
568	7338	Y73880	Homo sapiens	Human prostate tumor EST fragment derived protein #67.	1566	100
569	736	gi10178317	Homo sapiens		1468	100
570	737	G00851	Homo sapiens	Human secreted protein,	522	98
571	740	W85610	Homo sapiens	Secreted protein clone eh80_1.	1115	87
572	7400	Y93948	Homo sapiens	Amino acid sequence of a lectin ss3939 polypeptide.	1982	98
573	7415	gi3043670	Homo sapiens	KIAA0573 protein	2392	100
574	7429	Y40864	Homo sapiens	A human glutathione-S-transferase (hGST) protein.	1183	99
575	7458	Y53643	Homo sapiens	A bone marrow secreted protein designated BMS6.	554	99
576	7516	gi4468311	Homo sapiens		1146	99
577	7526	gi4138922	Homo sapiens	promyelocytic leukemia zinc finger	3571	99

SEQ ID NO:	SEQ ID NO: in USSN 09/488,725	Accession No.	Species	Description	Smith - Waterman Score	% Identity
				protein; kruppel-like zinc finger protein; PLZF		
578	7571	G02915	Homo sapiens	Human secreted protein,	209	100
579	7614	W74726	Homo sapiens	Human secreted protein fg949_3.	1879	100
580	7663	gi5912548	Homo sapiens		1634	100
581	7686	gi4929711	Homo sapiens	CGI-121 protein	870	100
582	7714	gi388765	Homo sapiens	phospholipase D	4428	99
583	7724	G03933	Homo sapiens	Human secreted protein,	570	100
584	7834	gi8919166	Homo sapiens	mesenchymal stem cell protein DSC92	1133	100
585	7855	Y48505	Homo sapiens	Human breast tumour-associated protein 50.	684	100
586	7870	Y13372	Homo sapiens	Amino acid sequence of protein PRO223.	2559	100
587	7871	Y91689	Homo sapiens	Human secreted protein sequence encoded by gene 93	768	100
588	7892	gi34659	Homo sapiens	macrophage inflammatory protein-2alpha precursor	532	100
589	7927	gi32575	Homo sapiens		183	91
590	7944	gi1657458	Sus scrofa	calcium/calmodulin-dependent protein kinase II isoform gamma-B	2744	100
591	7947	G01131	Homo sapiens	Human	574	96

SEQ ID NO:	SEQ ID NO: in USSN 09/48 8,725	Accession No.	Species	Description	Smith - Water man Score	% Identity
				secreted protein,		
592	800	gi30214 28	Homo sapiens	neutral sphingomyelina se	167	68
593	8055	gi49296 37	Homo sapiens	CGI-84 protein	1038	100
594	8082	gi46790 14	Homo sapiens	HSPC014	715	100
595	8127	gi99556 93	Homo sapiens	twisted gastrulation protein	905	95
596	8174	gi55322 94	Homo sapiens	MUM2	767	100
597	8178	gi45305 87	Homo sapiens	TADA1 protein	1132	100
598	8215	R66278	Homo sapiens	Therapeutic polypeptide from glioblastoma cell line.	830	100
599	8263	Y48371	Homo sapiens	Human prostate cancer- associated protein 68.	713	98
600	827	gi31723 37	Cavia porcellus	phospholipase B	955	73
601	828	Y29517	Homo sapiens	Human lung tumour protein SAL-82 predicted amino acid sequence.	833	94
602	8294	gi49297 67	Homo sapiens	CGI-149 protein	1085	100
603	8313	gi57714 20	Homo sapiens	group IID secretory phospholipase A2	852	100
604	832	Y86260	Homo sapiens	Human secreted protein HELHN47,	319	78
605	8357	gi41913 58	Mus musculus	claudin-7	164	47
606	8373	gi19452 71	Homo sapiens	protein phosphatase 6	1666	100
607	8379	gi58529	Homo sapiens		1226	100

SEQ ID NO:	SEQ ID NO: in USSN 09/488,725	Accession No.	Species	Description	Smith - Waterman Score	% Identity
		81		cardiotrophin-like cytokine CLC		
608	8380	gi3402216	Homo sapiens	protein	974	100
609	8386	gi386988	Homo sapiens	oncostatin M	1297	99
610	8418	Y70210	Homo sapiens	Human TANGO 130 protein.	722	98
611	8442	G01895	Homo sapiens	Human secreted protein,	490	95
612	8457	G04048	Homo sapiens	Human secreted protein,	450	98
613	8458	W97119	Homo sapiens	S-adenosyl-L-methyltransferase (SAM-MT) protein.	1484	100
614	8469	gi7159799	Homo sapiens		255	100
615	8480	gi4589530	Homo sapiens	KIAA0943 protein	1998	100
616	8521	gi5726235	multiple sclerosis associated retrovirus element	unknown protein U5/2	250	82
617	857	gi9663958	Homo sapiens	cysteinyl leukotriene CysLT2 receptor	612	99
618	8574	gi6841260	Homo sapiens	HSPC305	1049	100
619	8606	gi3367707	Homo sapiens	scrapie responsive protein 1	544	100
620	8632	G01158	Homo sapiens	Human secreted protein,	502	100
621	8646	gi3882249	Homo sapiens	KIAA0764 protein	2175	100
622	8666	Y66196	Homo sapiens	Human bladder tumour EST encoded protein 54.	1080	95
623	8675	gi9963908	Homo sapiens	NPD009	432	96
624	8683	G04018	Homo sapiens	Human	469	98



SEQ ID NO:	SEQ ID NO: in USSN 09/48 8,725	Accession No.	Species	Description	Smith - Waterman Score	% Identity
				secreted protein,		
625	8708	gi1633564	Homo sapiens	C8	364	98
626	8720	gi8248465	Homo sapiens	hepatocellular carcinoma-associated antigen 56A	191	69
627	8756	Y94984	Homo sapiens	Human secreted protein vell_1,	369	97
628	8765	Y00346	Homo sapiens	Fragment of human secreted protein encoded by gene 2.	1068	97
629	8783	Y27918	Homo sapiens	Human secreted protein encoded by gene No. 123.	1051	95
630	8804	Y25426	Homo sapiens	Human SIGIRR protein.	887	100
631	8838	Y99409	Homo sapiens	Human PRO1343 (UNQ698) amino acid sequence	1279	100
632	8851	W74785	Homo sapiens	Human secreted protein encoded by gene 56 clone HSAXS65.	454	100
633	8853	W75116	Homo sapiens	Human secreted protein encoded by gene 60 clone HILCJ01.	245	95
634	8857	gi2565196	Homo sapiens	non-functional folate binding protein	479	74
635	8859	Y02690	Homo sapiens	Human secreted protein encoded by gene 41c lone	600	100

SEQ ID NO:	SEQ ID NO: in USSN 09/488,725	Accession No.	Species	Description	Smith - Waterman Score	% Identity
				HSZAF47.		
636	8901	Y86491	Homo sapiens	Human gene 59-encoded protein fragment,	548	99
637	8907	W88745	Homo sapiens	Secreted protein encoded by gene 30 clone HTSEV09.	2004	99
638	8934	W75088	Homo sapiens	Human secreted protein encoded by gene 32 clone HAGBB70.	421	98
639	8960	Y02693	Homo sapiens	Human secreted protein encoded by gene 44 clone HTDAD22.	267	72
640	8979	Y76143	Homo sapiens	Human secreted protein encoded by gene 20.	1374	98
641	8980	Y11433	Homo sapiens	Human 5' EST secreted protein	466	100
642	8986	G02626	Homo sapiens	Human secreted protein,	306	100
643	8987	G02093	Homo sapiens	Human secreted protein,	486	97
644	8995	Y12908	Homo sapiens	Human 5' EST secreted protein	181	100
645	9035	Y71108	Homo sapiens	Human Hydrolase protein-6 (HYDRL-6).	800	100
646	9062	gi8886005	Homo sapiens	lysophosphatidic acid acyltransferase-delta	523	100
647	9074	Y25761	Homo sapiens	Human	1366	99

SEQ ID NO:	SEQ ID NO: in USSN 09/488,725	Accession No.	Species	Description	Smith - Waterman Score	% Identity
				secreted protein encoded from gene 51.		
648	9075	Y73336	Homo sapiens	HTRM clone 1852290 protein sequence.	1591	100
649	9098	Y57878	Homo sapiens	Human transmembrane protein HTPN-2.	516	100
650	9109	gi23903	Homo sapiens	63kDa protein kinase	1141	97
651	911	gi32456	Homo sapiens	protein-tyrosine phosphatase	2591	100
652	912	gi1136743	Homo sapiens	human P5	212	46
653	9163	Y34129	Homo sapiens	Human potassium channel K+Hnov28.	377	71
654	9164	Y41324	Homo sapiens	Human secreted protein encoded by gene 17 clone HNF1Y77.	1083	99
655	9173	gi6851256	Mus musculus	protein tyrosine phosphatase-like protein PTPLB	631	93
656	9187	Y66721	Homo sapiens	Membrane-bound protein PRO511.	1173	95
657	9190	W40378	Homo sapiens	Human breast cancer protein CH14-2a16-1 from 2.0 kB DNA fragment #2.	792	81
658	9194	Y02781	Homo sapiens	Human secreted protein.	462	70
659	9210	G02994	Homo sapiens	Human secreted protein,	166	80

SEQ ID NO:	SEQ ID NO: in USSN 09/488,725	Accession No.	Species	Description	Smith - Waterman Score	% Identity
660	9222	G02520	Homo sapiens	Human secreted protein,	186	43
661	9230	gi6706554	Homo sapiens	inositol 1,4,5-trisphosphate 3-kinase B	1315	95
662	9258	gi522145	Homo sapiens	B-cell growth factor	120	56
663	9260	G04072	Homo sapiens	Human secreted protein,	138	51
664	9271	gi6690095	Homo sapiens	tetraspanin protein	317	67
665	9272	gi163042	Bos taurus	factor activating exoenzyme S	444	72
666	9275	gi401774	Homo sapiens	ribosomal protein S6 kinase 3	424	81
667	930	G02355	Homo sapiens	Human secreted protein,	167	41
668	9304	gi8979743	Canis familiaris	Band4.1-like5 protein	1493	93
669	9346	gi2738989	Mus musculus	high mobility group protein homolog HMG4	384	89
670	9347	gi36613	Homo sapiens	serine/threonine protein kinase	199	91
671	935	gi5541870	Homo sapiens	QA79 membrane protein, allelic variant airm-1b	334	57
672	9350	gi3327124	Homo sapiens	KIAA0655 protein	757	87
673	9351	W57260	Homo sapiens	Human semaphorin Y.	573	95
674	9356	gi59977	Human endogenous retrovirus	tripartite fusion transcript PLA2L	127	59
675	9363	Y17834	Homo sapiens	Human PRO361 protein sequence.	968	92
676	9366	gi72431	Homo sapiens	KIAA1374	649	96

SEQ ID NO:	SEQ ID NO: in USSN 09/488,725	Accession No.	Species	Description	Smith - Waterman Score	% Identity
		29		protein		
677	9369	G03793	Homo sapiens	Human secreted protein,	222	69
678	9378	gi4468311	Homo sapiens		163	39
679	9393	gi2738989	Mus musculus	high mobility group protein homolog HMG4	384	89
680	9444	G01399	Homo sapiens	Human secreted protein,	157	93
681	9467	gi4454702	Homo sapiens	HSPC007	230	71
682	9486	gi10047243	Homo sapiens	KIAA1584 protein	605	93
683	949	Y30895	Homo sapiens	Human secreted protein fragment encoded from gene 25.	704	99
684	9499	W36002	Homo sapiens	Human Fchd531 gene product.	2173	96
685	9510	gi1665799	Homo sapiens		867	83
686	9523	Y53022	Homo sapiens	Human secreted protein clone qf116_2 protein sequence	1252	89
687	9534	Y66670	Homo sapiens	Membrane-bound protein PRO1180.	998	100
688	9539	Y76144	Homo sapiens	Human secreted protein encoded by gene 21.	633	100
689	954	G02490	Homo sapiens	Human secreted protein,	160	78
690	9546	gi181121	Homo sapiens	chorionic somatomammotropin	616	96
691	955	gi7243103	Homo sapiens	KIAA1361 protein	2042	100
692	9551	gi17723	Homo sapiens	ras-related	341	57

SEQ ID NO:	SEQ ID NO: in USSN 09/48 8,725	Accession No.	Species	Description	Smith - Waterman Score	% Identity
		45		GTP-binding protein		
693	9558	W88403	Homo sapiens	Human adult testis secreted protein ga63_6.	2252	100
694	9561	gi66900 17	Herpesvirus papio	NTR	100	30
695	957	Y86260	Homo sapiens	Human secreted protein HELHN47,	319	78
696	9572	gi97294 0	Mus musculus	Elf-1	806	92
697	9576	gi32490 05	Homo sapiens	geminin	448	98
698	9586	gi28872 88	Homo sapiens	mRNA cleavage factor I 25 kDa subunit	208	100
699	9587	G00995	Homo sapiens	Human secreted protein,	726	99
700	9592	gi49527 3	Rattus norvegicus	ribosomal protein S15a	202	78
701	9595	gi77999 12	Homo sapiens	UBASH3A protein	453	47
702	9610	Y07875	Homo sapiens	Human secreted protein fragment encoded from gene 24.	574	100
703	9634	Y73325	Homo sapiens	HTRM clone 001106 protein sequence.	820	99
704	9639	G00805	Homo sapiens	Human secreted protein,	155	67
705	9647	G03786	Homo sapiens	Human secreted protein,	196	73
706	9653	gi38823 41	Homo sapiens	KIAA0810 protein	523	100
707	9654	G01924	Homo sapiens	Human secreted protein,	469	100
708	9678	Y99376	Homo sapiens	Human PRO1244 (UNQ628) amino	474	100

SEQ ID NO:	SEQ ID NO: in USSN 09/48 8,725	Accession No.	Species	Description	Smith - Waterman Score	% Identity
				acid sequence		
709	9709	Y11825	Homo sapiens	Human 5' EST secreted protein	657	100
710	9722	gi76774 22	Mus musculus	GTPase Rab37	189	75
711	9731	Y12424	Homo sapiens	Human 5' EST secreted protein	207	100
712	9742	Y57954	Homo sapiens	Human transmembrane protein HTPN-78.	484	100
713	9749	gi36878 29	Homo sapiens	hT41	386	65
714	9755	gi20552 95	Homo sapiens	Similar to a C.elegans protein in cosmid C14H10	2583	100
715	9762	G03436	Homo sapiens	Human secreted protein,	176	61
716	9763	gi61800 11	Homo sapiens	anaphase-promoting complex subunit 4	1016	100
717	9784	G03570	Homo sapiens	Human secreted protein,	401	96
718	9794	G00803	Homo sapiens	Human secreted protein,	333	69
719	9795	gi25162 42	Mus musculus	Rab33B	669	94
720	9798	gi55859 9	Homo sapiens	ZID, zinc finger protein with interaction domain	605	96
721	9805	Y25881	Homo sapiens	Human secreted protein fragment encoded from gene 61.	566	96
722	9816	gi53205 6	Homo sapiens	protein-tyrosine-phosphatase	384	100
723	9830	G00857	Homo sapiens	Human	539	96

SEQ ID NO:	SEQ ID NO: in USSN 09/488,725	Accession No.	Species	Description	Smith - Waterman Score	% Identity
				secreted protein,		
724	9836	G00914	Homo sapiens	Human secreted protein,	527	100
725	9837	gi2662099	Homo sapiens	KIAA0409	230	67
726	984	Y29517	Homo sapiens	Human lung tumour protein SAL-82 predicted amino acid sequence.	833	94
727	9849	gi7229305	Homo sapiens	ZNF264, partial cds	140	90
728	9851	gi5262560	Homo sapiens	hypothetical protein	369	64
729	9859	gi3881976	Homo sapiens	hypothetical protein	167	93
730	9863	gi7295707	Drosophila melanogaster	CG15433 gene product	837	78
731	9888	gi3319677	Homo sapiens		209	72
732	989	gi4557143	Rattus norvegicus	zinc finger protein RIN ZF	604	92
733	9919	G01843	Homo sapiens	Human secreted protein,	586	100
734	9922	W67869	Homo sapiens	Human secreted protein encoded by gene 63 clone HHGDB72.	551	93
735	9947	W78239	Homo sapiens	Fragment of human secreted protein encoded by gene 3.	251	78
736	9956	Y36203	Homo sapiens	Human secreted protein #75.	273	77
737	9961	Y99357	Homo sapiens	Human PRO1190 (UNQ604) amino acid sequence	650	99
738	9972	Y12149	Homo sapiens	Human 5' EST secreted protein	284	100
739	9977	gil0039	Homo sapiens	osteoblast	822	98



SEQ ID NO:	SEQ ID NO: in USSN 09/488, 725	Accession No.	Species	Description	Smith - Waterman Score	% Identity
		439		differentiation promoting factor		

Table 3 - Amino Acids

SEQ ID NO: of Nucleic Acids	SEQ ID NO: of Amino Acids	Predicted beginning nucleotide location corresponding to first amino acid residue of amino acid sequence	Predicted end nucleotide location corresponding to first amino acid residue of amino acid sequence	Amino acid segment containing signal peptide (A=Alanine, C=Cysteine, D=Aspartic Acid, E= Glutamic Acid, F=Phenylalanine, G=Glycine, H=Histidine, I=Isoleucine, K=Lysine, L=Leucine, M=Methionine, N=Asparagine, P=Proline, Q=Glutamine, R=Arginine, S=Serine, T=Threonine, V=Valine, W=Tryptophan, Y=Tyrosine, X=Unknown, *=Stop Codon, /=possible nucleotide deletion, \=possible nucleotide insertion)
1	740	2	557	FVGRLLRLGEALRLRPDPSSGGCRLQPALVGTEMSEKENNFPP LPKFIPVKPCFCFYQNFSD EIPVEHQVLVKRIYRLWMFYCATLGV NLIACLAWWIGGGSGTNFGLAFVWLLLFTPCGYVCWFRPVYKA FRADSSFNFMAFFFI FRSPVCPDRHPGDWLLRLGRVRLAVGNW ILPVQPGRCRGHA
2	741	305	838	FLGAGADIFCAYLRMSSKQATSPFACAADGEDAMTQDLTSREK EEGSDQHVASHLPLHPIMHNKPHSEELPTLVSTIQDADWDSV LSSQQRMESENKLC SLYSFRNTSTSPHKPDEGSRDRREIMTSV TFGTPERRKGSLADVDTLQKQKLEEMTRTEQEDSSCMEKLLS KDWKE
3	742	12	1315	EGYLTGRPTRPVAVRGKSTADLRMMGRSPGFAMQHIVGVPHVL VRRGLLGRDLFMTRTLCSPGPSQPGKEKRPEEVALGLHHRPAL GRALGHSIQQRATSTAKTWWDYEEFVGLNEVREAQGVTEAE KVFVMVARGLVREAREDLVHQAKLKEVRDRDLDRVSREDSQYLE LATLEHRMLQEEKRLRTAYLRAEDSEREKFSLSA AVRESHEK ERTRAERTKNWSLIGSVLGALIGVAGSTYVNRVRLQELKALLL EAQKGPFVSLQEAIREQASSYSRQQRD LHNLMVDLRLGLVHAAGP GQDSGSQAGSPPTRDRDVLVSAALKEQLSHSRQVHSCLEGLR EQLDGLEKTCSQMAGVVQLVKSAHPGLVEPADGAMP SFLL EQ GSMILALSDTEQRLEAQVNRNTIYSTLVTCVTFVATLPVLYML PKAS
4	743	112	745	NLPPLTPQPGPRLAGSGPSHWFSPLSLPVASKAPGTMAQALGE DLVQPPELQDDSSSLGSDSELSGPGPYRQADRYGFIGGSSAEP GPGHPPADLIRQREMKWVEMTSHWEKTMSTRYKVKVMQCRKGI PSALRARCWPLLCGAHVCQKNSPGTYQELAEAPGDPQWMETIG RDLHRQFPLHEMFVSPQGHGQQGLLQVLKAYTLTYRPEQG
5	744	99	265	LRGMAAAAAGPAASQRFFQSFSDALIDQDPQAALVGEPPFLLP PLPADPPPSSTA

SEQ ID NO: of Nucleic Acids	SEQ ID NO: of Amino Acids	Predicted beginning nucleotide location corresponding to first amino acid residue of amino acid sequence	Predicted end nucleotide location corresponding to first amino acid residue of amino acid sequence	Amino acid segment containing signal peptide (A=Alanine, C=Cysteine, D=Aspartic Acid, E= Glutamic Acid, F=Phenylalanine, G=Glycine, H=Histidine, I=Isoleucine, K=Lysine, L=Leucine, M=Methionine, N=Asparagine, P=Proline, Q=Glutamine, R=Arginine, S=Serine, T=Threonine, V=Valine, W=Tryptophan, Y=Tyrosine, X=Unknown, *=Stop Codon, /=possible nucleotide deletion, \=possible nucleotide insertion)
6	745	210	758	WACFRSAHCSRHLNRIFMYLYWDKTRSPVCKGPFALREERPQP RLKLEDYKDRLLKSGEHLNPDQLEAVEKEYEVLHNLFAKELQK TFSGLSLDLLKQKKAQRREHMLKLEAEKKLRITILQVQYVLQ NLTQEHVQKDFKGGGLNGAVYLPSELDYLIKFSKLTCPERNES LRQTLEGSTV
7	746	48	450	XAGVQMKLEFLQKRFWAATRQCSTVDGPCTQSCEDSDLDCEVFI DNNGFILISKRSRETGRFLGEVDGAVLTQLLSMGVFSQVTMYD YQAMCKPSSHHHSAQPLVSPISAFLTATRWLLQELVLFLEW SVWGSX*
8	747	1	469	CRGRLAQLLEEAAVAATMSAGDAVCTGWLKSPPERKLQRYAWR KRWFLVLRGRMSGNPDVLEYRNRKHSSKPIRVIDLSECAVWKH VGPSFVRKEFQNNFVIVKTTSTRTFYLVAKTEQEMQVWVHSIS QVCNLGHLEDGAADSMESLSYTRSYLQ
9	748	242	409	IPAVPLTSCVTVGSYSLSVRDYDPRQGDTVKHYKIRTL\DKRG FYISP\RSTFSTLQ
10	749	1	1146	KDSVLNLIARGKKYGEKTKRVSSRKKPALKC/TSQKQPALKATC DKEDSVNPNTATEKKDEQISGTVSSQKQPALKATSDKKDSVSN I PTEIKDQSGTGVSSQKQPAWKATSVKKDSVSNIAITEIKDQGI \RGTVSSQKQPALKATGDEKDSVSNIAIEIKDGEKSGTVSPQ KQSAQKVIFKKVSLNLIATRITGGWKSGETEYPENLPTLKATI ENKNSVLNTATKMKDVQTSTPEQDLEMASEGEQKRLBEYENNQ PQVKNIHSRDDLDIIQSSQTVSEDDSLCCNCKNVILLIDQ HEMCKKDCVHLLKIKKTFCLCKRLTELKDNHCEQLRVKIRKLK NKASVLQKRLSEKEEIKSQLKHETLELEKELCSLRFATQ
11	750	3	892	SPLRYRAGQSGSTISSSSCAMWRCGGRQGLCVLRLRSGGHAHH RAWRWNSNRACERALQYKLGDKIHGFTVNQVTSVPELFLTAVK LTHDDTGARYLHLAREDNTNNLFSVQFRTTPMDSTGVPHILEHT VLCGSQKYPICRDPFFKMLNRSLSFTMNAFTASDYTLYPFSTQN PKDFQNLSSVYLDATFFPCLRELDWFQEGWRLEHENPSDPQTP LVFKGVVFNEMKGAFDNERIFSQHLQNRLLPDHTYSVVSGGD PLCIPELTWEQLKFHATHYHPSNARFFTYGNFPLDQH
12	751	367	856	RGAKAKSAVLPPGPPCSSILILSPPAPLTPRSPGTEATRPTAM SKSLKKKSHWTSKVHESVIGRNPEGQLGFELKGAENGQFPYL GEVKPGKVAYESGSKLVSEELLLLEVNETPVAGLTIRVDLAVIK HCKDPLRLKCVKQGESSGLLSVLPGGGTARGAGQ
13	752	144	442	SHRPQPDARWQGNFQCVQKEKMQVSSAEVRIGPMRLTQDPIQ VLLIFAKEDSQSDGFWACDRAGYRCNIARTPESALECFLDKH HEIIVIDHRQTQN
14	753	1	581	FRLAGCGHLEVSLLGLLLLLARSGTRALVCLPCDESKCEEPRN CPGSIVQGVCGCCYTCASQRNESCGETFGIYGTCDRGLRCVIR PPLNGDSLTEYAGVCEDENWTDDQLLGFKPCNENLIAGCNII NGKCECNTIRTCSNPFEFPQDMCLSAKRIEEKPCDCKARC EVQFSPRCPEDSVLIEGYAPP

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15	754	1	219	FRMAANVGSMFQYWKRFDLQQLQRELDATATVLANRQDESEQS RKRLIEQSREFKNTPEVRRVTIVFALKGS
16	755	313	562	ETLSCRIMDHPSREKDERQRTTKPMAQRSACSRPSGSSSSSG VLMVGPNFRVGGKIGCGNFGELRLGEGLPQVYVFGPCGKY
17	756	273	574	GCCKD*HSGVIGRSWAMLFASGGFQVKLYDIEQQQIRNALENI RWASRRSPEGMEVGLFLSVGLVCHILKAMRICDVTFSDDGYCS ASELVKARPTVAGM
18	757	3	390	NSRVDDFVSARPKPRPLPRARGMVVVTGREPDSRRQDGAMSSS DAEDDFLEPATPTATQAGHAL/PPAAT/GSFLRLFLPTSEGLT SLHACPHCGATKTPCWQPCSVGGTTSPTTPRAGTSSTEMAHTL EMC
19	758	98	461	RALWVGCGSGEACGIGMSGLLTDPEQRAQEPYPYGFVLGLDVG SSVIRCHVYDRAARVCGSSVQKVENLYPQIGWVEIDPDVLWIQ FVAVIKEAVKAAAGIQMNQIVGLGISTQRTATFITWN
20	759	100	731	GLAAEQSMQFVKLWCGCSGEFPTRLRRRTPLTEAMEGGPAVCC QDPRAELVERVAIDVTHLEEADGGPEPTRNGVDPPPRARAAS VIPGSTSRLLPARPSLSARKLSLQERPAGSYLEAQAGPYATGP ASHISPRAWRRPTIESHHVAISDAEDCVQLNQYKLQSEIGKGA YGVVRLAYNESEDRHYAMKVLSSKKLLKQYGFRRPPP
21	760	2	520	FVYGKPVTLWPTISSVVPSTFLGLGNVEVEAEAPDVRGPEIV TMGENDPFAVEAPFSFRSLFGLDDLKISPVAPDADAVAAQILS LLPLKFPIIVIGIIALILALAIGLGIHFDCSGKYRCRSSFKC IELIARCDGVSDCKDGEDEYRCVVRVGGQNAALQVFTAASRKT
22	761	158	470	SLAMPFGCVTLGDKKNYNQPSVETDRYDLGQVIKTEEFCEIFR AKDKTTGKLHTCKKFQKRDGRKVRKAAKNEIGILKMVKHPNIL QLVDVFVTRKEYFIFLEL
23	762	1	749	QRRRFRAGLWGGHGLTDGLRRNGGCGCSARVPRVGERLRGHR PDPLCLLLDMLFLSFHAGSWESWCCCLIPADRPWDRGQHWQL EMADTRSVHETRFEEAAVKVIQSLPKNGSFQPTNEMMLKFYSFY KQATEGPCKLSRPGFWDP IGRYKWDWSSSLGDMTKEEAMIAVY EEMKKI IETMPMTEKVEELLRVIGPFYEIVEDKKSGRSSDITS DLGNVLTSTPNAKTVNGKAESSDSGAEESEEEAC
24	763	3	558	SCFKGRTGGRSGSSGDSSRWARGRHFSASTEPEPLSQPCSAL PRSGRRGCAVPSSVTKMLSFFRRTLGRSSMRKHAERLREAO RAATHIPAAGDSKSIITCRVSLLDGTDVSVLPPKAKGQELFD QIMYHLDLIESDYFGLRFMDSAQVAHWLDGTSIKKQVKIGSP YCLHLRVKFYSS
25	764	9	424	ESRERSGNRRGAEDRGTCGLQSPSAMLGAKPHWLPGLHSPGL PLVLVLLALGAGWAQEGSEPVLLGECELVVCEPGRAAAGGPGG AALGEAPPGRVAFAAVRSHHHEPAGETGNGTSGAIYFDQVLVN EGGGFDRAS

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26	765	2	507	EDVKSYYTVHLPQLENINSGETRTISHFYHTTWPDFGVPQSPA SFLNLFLEKVRRESGSLNPDHGPVVIHRSAGTGRSSTFSVVHTCL VLMEKGDDINIKQVLLNIRKFQMGILI\QTPDQLRFSYMAITEG AKCVKGDSSIQKRWKELSKE/DLPPAFDHSFNKIMTEKYNR
27	766	84	852	LNRQRCGDQVLVPGTGLAAILRTLPMFHDEEHARAGLSEDTL VLPPASRNQRILYTVLEECQPLFDSSDMTIAEWVCLAQTIKRHY EQYHGFVVIHGTDTMAFAASMLSFMLENLQKTVILTGAQVPIH ALWSDGRENLLGALLMAGQYVIVEVCLFFQNQLFRGNRATKVD ARRFAAFCSPNLLPLATVGADITINRELVRKVDGKAGLVVHSS MEQDVGLLRLYPGIPAALVRAFLQPPLKGVVMTFTGSGNG
28	767	992	210	LFRLAPGFLRSLARQGYHQIWAFFFLPSGATATWPAASRSRSL AARSLPRSPARPGPNDAALLGEHDFRQGQVRAQRFRFSEEPGPG ADGAVLEVHVPPQIGAGVSLPGILAACKGAEVILSDSSELPHCL EVCROSCQMNNLPHLQVVGLTWGHI SWDLLALPPQDIILASDV FFEPEDFEDILATIYFLMHKNPKVQLWSTYQVRSADWSLEALL YKWDMKCVHIPLESFADADKEDIAESTLPGRHTVEMLVISFAKD SL
29	768	23	624	SFIYKHTHRARFGPRAIVASPALTAGPHVSLTASCRVGMWVSC SPSPFLHPTNTLVAVLERDTLGIREVRLFNAVVRWSEAEQCRQ QLQVTPENRRKVLGKALGLIRFPLMTIEEFAAGNRARAQGLVW EGSGTQVGW/CTEDSAPEFTAESLADAWHIQIGRNLACEDAS T/WAIC*PRPGSVPTVHTARPLSCLSSCF
30	769	100	2	MASTQDAELAVSRXRAIALXPGXQSQXXPSQKKK
31	770	158	1957	LLKSCGVLLSGVCIPCEGKGPTVLVIQTAVPQDRPTKSSMRSA AKPWNPAIRAGGHGPDVRPLPAASSGMKSSKSSSTSLAFESRL SRLKRASSEDTLNKP GSTAASGVVRLKKTATAGAISELTESRL RSGTGAFTTTKRTGIPAPREFSVTVSRERSVPRGPSNPRKSVS SPTSSNTPTPTKHLRTPSTKPKQENEGGEK\VRLSPK/FRELL AEAKADSEINRLRSELKKYKEKRTLNAEGTDALGPNVDGTSV SPGDTEPMIRALEEKNKNFQKELSDLEENRVLKEKLIYLEHS PNSEGAASHTGDSSCPTSITQESSFGSPTGNQLSSDIDEYKKN IHGNALRTSGSSSSDVTKASLSPDASDFEHITAETPSRPLSST SNPFKSSKCSTAGSSPNSVSELSLASLTEKIQKMEENHHSTAE ELQATLQELSDQQQMVQELTAENEKLVDEKTILETFSFHQHRER AEQLSQENEKLMNLLQERVKNEEPTTQEGKIIEBLEQKCTGILE QGRFEREKLLNIQQQLTCSLRKVEEENQGALEMIKRLKEENEK LNEFLELERHNNMMMAKTLEECRVTLEGLKMENGSLKSHLQG
32	771	203	514	SQMRHLIFVYTLICANFCSCRDTSATPQSASIKALRNANLRD ESNHLTDLYRRDETIQVKNGYVQSPRFPNSYPRNLLLTWRLH SQENTRIQLVFDNQFGL

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33	772	59	713	PFFKMTDLLRSVVTVIDVFYKYTKQDGECSGLSKGELKELLEK ELHPVLKPNDDPDVTVDVIMHMLDRDHRRDLDFTEFLLMIFKLT MACNKVLSKEYCKASGSKHRRGHRHQEESETEDEEDTPGH KSGYRHSSWSEGEHHGYSSGHSRGTVKCRHGSNSRRLGRQGNL SSSGNQEGSQKRYHRSSCGHSWGGKDRHGSSSVELRERINKS HIK
34	773	209	601	VPKISGPDHIDFIPWDQLFMASSSSVTEFLVLGFSSSLGELQLV LFAVFLCLYLIILSGNIIIIISVIHLDSLHTPMYFFLGILSIS EIFYTTVILPKMLINLFSVFRTLSFVSCATQMFYEIVGPGTQE R
35	774	373	987	DHSTETPGIPAAEPVSHGTGKLERAPTLPAGAELPAPAAVPCP TL*VC/LYPQLLGLSVATMVTLTLYFGAHFAVIRRASLEKNPYQ AVHQWGTQORLIQHPESGSEGQSLGLPLRAFSAGLSLVGLLTL GAVLSAAATVREAQGLMAGGFLCFSLAFCAQVQVFWRLHSPT QVEDAMLDTYDLVYEQAMKGTSHVRRQELAAIQ
36	775	102	466	QPGYSEYDKNRGQGMMLNMMCGRQLSAISLCLAVTFAPLFAQ ADEPEVIPGDSPPAVSEQGEALPQAQATAIMAGIQPLPEGAAE KARTQIESQLPAGYKPVYLNQLQLLYAARGISCSV
37	776	2	430	RTRAADVVFSLTGKSRNVSSSTVRRSAVGGMSALALFDLLKP NYALATQVEFTDPEIVAIEYITYPSPNGHGEVRYLVKPAKMSG KTPAVVVVHENRGLNPYIEDVARRVAKAGYIALAPDGLSSVGG YPGNDIKVVSAAA
38	777	106	556	VKQRHGNSLLTTETKTCISCRGLGVPLSPQRRFQAIRIEEVKLRW FAFLIVLLAGCSSKHDTNPPWNAKVPVQRAMQWMPISQKAGA AWGVDPQLITAIIAIESGGNPNNAVSKSNAIGLMQLKASTSGRD VYRRMGWSGEPTTSELKNSSR
39	778	3	892	HAAGIRHEAKPKRSFYAARDLYKYRHQYPNFKDIRYQNDLSNL RFYKNKIPFKPDGVYIEEVL SKWKGDYKLEHNHTYIQWLFPL REQGLNFYAKELTTYEIEEFKKTKEAIRRFLLAYKMMLEFFGI KLTDKTGNVARAVNWQERFQHLNESQHNYLRITRILKSLGELG YESFKSPLVKFILHEALVENTIPNIKQSALEYFVYTIRDRER RKLLRFAQKHYPSENFIWGPPEKEQSEGSKAQKMSSPLASSH NSQTSMHKKAKDSKNSSSAVHLNSKTAEDKKVAPKEPV
40	779	123	395	ELQVFQPIGMSDGSQSGSLTMKSQQLQITVISAKLKENK KNWFGPSPYVEVTVDGQSKKTEKCNNTNSPKWKQPLTVIVTPV SKLH
41	780	173	438	IETLSFVIRNWNTHAMSKPIVMERGVKYRDADKMALIPVKNA TEREALLRKPEWMKIKLPADSTRIQGIKAAMRKNGLHSVCEEAS C
42	781	287	393	PRMVLGKQPQTDPTLEWFLSHCHIHKYPSTLIPQ
43	782	119	556	GLRISVQERIKACFTESIQTQIAAAEALPDAISRAAMTLVQSL LNGNKILCCNGTSAANAQHFAASMINRFETERPSLPAIALNT DNVVLTAIANDRLHDEVYAKQVRALGHAGDVLLAISTRGNSRD IVKAVEAAVTRDTTIV

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44	783	248	554	KQTQHAPGMMKKYLALALIAPLLISCSTTKKGDYNEAWVKDT NGFDILMGQFAHNIEINWGFKEVVIAGPKDYVKYTDQYQTRSH INFDDGTITIEPIPGT
45	784	77	311	TDR TALNPGQESAMNRLFSGRSDMPFALLLLAPSLLLGGLVA WPMVSNIEISFLRLPLNPNIESTFVGVSNYVRILS
46	785	184	627	KELVDEKSERGRAMDPVSQLASAGTFRVLKEPLAFRLRALELLF AIFAFATCGGYSGGLRLSVCVNKTESNLSIDIAFAYPFRHLHQ VTFEVPTCEGKERQKLALIGDSSSSAEFFVTVAVFAFLYSLAA TGRYIFFHNKNRENNRGPL
47	786	3	742	LGTVSYGADTMDEIQSHVRDSYSQMOSQAGGNNTGSTPLRKAQ SSAPKVRKSVSSRIHEAVKAIVLCHNVTPVYESRAGVTEETEF AEADQDFSDENRTYQASSPDEVALVQWTESVGLTLVSRDLTSM QLKTPSGQVLSFCILQLFPFTSESKRMGVIVRDESTABITFYM KGADVAMSPIVQYNDWLEEECGNMAREGLRTLIVVAKKALTEEQ YQDFEVSRLPGIPSSYDGAFLTLKLVLPVFV
48	787	864	335	EGPHR\RLFQMVKA/LQEAPEDPNQILIGYSRGLVVIWDLQGS RVLYHFLSSQOLENIWWQRDGRLLVSDGSGSYCQW\ PVSSEA QQPEPLRSLVPYGPFPCKAITRILWLTTTQGLPFTIFQGGMPR ASYGDRHCISVIHDGQQTAFDFTSRVIGFTVLTEADPAASRRA SGVGAQG
49	788	410	951	KQGLEVRDLHFKEITSGRALLRVACKRPSMVPGGQLQRAGAGA QARITGLSPALWGARVHGWIPELPAGLPFGACLWPLIPACPSR HWGWVSAPVKG/WAQAILGLALCL/RGEHRLGAGVSKVRSLK MDRKVWTETLIEVGMPLLATDTWGLPHSTAVWVSQPPPYLSDH STLELERDPL
50	789	1	437	LSCNSEQALLSLVPVQRELLRRRYQSSPAKPDSSFYKGLGTCF SQLRLSEPPPTPRHLSVASVSHMFPSHRSLCPHLPDFFAAPP PSDNLPTYTLQSPFPSPPPATPSDHALILHH\DLNGGPDDPLQQ TGQLFGGLVRDIRRRYP
51	790	1	198	SPSSKLVGMWWAGRAGSSRTTSVSLCLP/SAPFGASNLLVNP LEPQNADKIKIKIADLGNACWVV
52	791	3	435	RVDPRVRAPRCGDKIKNHMY\KCDGSLKDCASDRCCETSCTL SLGSVCNTGLCCHKCKYAAPGVVCRDLGGICDLPEYCDGKKKE CPNDIYIQDGTTPCSAVSVCIRGNCSDRDMQCQALFGYQVKDGS PACYRKLNRIENRFGT
53	792	1	728	PGRPTRPDASLAQ/DPRTTMFRIPEFKWSPMHQRLTDLFAL ETDVHVWRS\HSTKSVMDFVNSNENIIFVHNTIHLISQMDNI IIACGGILPLLSAATSPTGSKTELENIETVQGMASAEAVTFLS RLMAMVDVLVFASSLNFSEIEAEKNMSSGGLMRQCLKLVCVA VRNCLECRQRQRDRGNKSSHGSSKPQEVPSVTATAASKTPLE NVPGNLSP IKDPDRLLDQVDINRLRAVVF

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54	793	2230	990	NSSGVKLLQALGLSPGNGKDHSILHSRNDLEEAFTHFMGKGAA AERFFSDKETFDIAQVASEFPGAQHVGNGAALIGQKFAANS DLKVLLCGPVGPKLHELLDDNVFVPPESLQEVDEFHLILEYQA GEEWGQLKAPHANRFIFSHDLNNGAMNMLEVFVSSLEEFQPD GGLSGLHMEGQSKELQRKRLLEVVTISIDIPTGIPV\HLELG \SMTNRELMSSIV\LQQVFPAVTSGLNEQELLFLTQSASGPH SSLSSWNGVPDVGMSDILFWILKEHGRSKSRASDLTRIHFT LVYHILATVDGHWANQLAAVAAGARVAGTQACATETIDTSRVS LRAPQEFMTSHSEAGSRIVLNPNKPVVEWHREGISFHFTEPLV CKDPIRTVGLGDAISAEGLFYSEVHPHY
55	794	249	3	DDSSGWGLEQLVVRWSLALWPRLECSGMISAHCNLC/LGSSD SPASAPRVAGITDVCHHAWLVFVFLVVMGFPHVGHVGLLELL
56	795	2	1176	LGEVLKCCQGVSSSLAFALAFQMDMKPLVVLGLPAPTAPSGC LSFWEAQAQLAKSCKVLVDALRHNAAAVFPFGGGSVLRRAEP APHASYGGIVSVETDLLQWCLESISIPILCPIGETAARRSVLL DSLEVTASLAKALRPTKIIFLNNTGGLRDSSHKVLNVNLPAD LDLVCNAEWVSTKERQQMRLIVDVLRLPHHSSAVITAASLL TELFNSNKGSGTLFKNAERMLRVRSLDKLDQGRIVDLVNASFGK KLRDDYLASLRPLHSTYVSEGYNAAILTMEPVLGGTPYLDK FVVSSSRQGGSGQMLWECLRRDLQTLFWRSRVTNPINPWYFK HSDGSFSNKQWIFFWGLADIRDSYELVNHAKGLPDSFHKPAS DPGS
57	796	755	374	YHAPALQPGQSKTSLSQEKKNFFRPGAVAHTCNPSTLGGRGGR ITRSGDRDHPG*HGETPSLLKIQKKLAGRDGGRL*SQLLGRLR QENGVNPGGGGCSEPRLRHCTPAW*QSETISRKKRKKERY
58	797	2	476	FRPIGIIROALCSADGHQRRILTLRLGLLVIPFLPASNLFFRV GFVVPVSGCCVMLLFGFG/ALRKHTEKKKLIAAVVLGILLS/N DAERLRCAVRGGEWRSE/EAVFRGAVSVCPLSAEVR CNIGRNL AAKGNQTGAIRYHREAVSLNPKTKSSSTREFRPC
59	798	3	711	KIADFGFSNLFPTGQLLKTWCGSPPYAAPELFEGKEYDGPKVD IWSLGVVLYVLVCGALPFDGSTLQNLRARVLSGKFRIPFFMST ECEHLIRHMLVLDPNKRLSMEQICKHKWMKLGADPNFDRLIA ECQQLKEERQVDPLNEDVLLAMEDMGLDKEQTLQSLRSDAYDH YSAIYSLLCDRHKRHKTLLRLGALPSMPRALGLSSTSQYP\AEQ AGTAMNISVPQVQLINPENQIV
60	799	2	344	AREFLGHRASITWS*ARVHHRFPKAEVA*P/SLLRDTLTDRT KCCHGDLLECADDRADLVEDIWENQDSISTILIECCEKPLEK SHCIAEVENDEMPADLPSLAADFVESKDV

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61	800	142	594	VPPKMKRGTSLSHRRGKPEAPKGS PQINRKSGQEMTAVMQSGR PRSSSTTDAPTGSAMMEIACAAAAAACLPGEEGTAERIERL EVSSLAQTSSAVASSTDGSIHTDSVDGTPDPQRTKAAIAHLQQ KILKLTQEQIKIAQTARRNRRPGS*KDCTP*KCLRKSDEALNRV LQQI\RVPPKMKRGTSLSHRRGKPEAPKGS PQINRKSGQEMTA VMQSGRPRSSSTTDAPTGSAMMEIACAAAAAACLPGEEGTA ERIERLEVSSLAQTSSAVASSTDGSIHTDSVDGTPDPQRTKAA IAHLQQKILKLTQEQIKIAQTARRNRRPG
62	801	232	1299	MQTIERLVKERDDLMSALVSVRSSLADTQQREASAYEQVKQVL QISEEANFEKTKALIQCQDLRKELERQAERLEKELASQOEKRA IEKDMMKKEITKEREYMGSKMLILSONIAQLEAQVEKVTKEKI SAINQLEEIQSQLASREMDVTKVCGEMRYQLNKTNMEKDEAEK EHREFRAKTNRDLEIKDQEI EKLRIELDSEKQHLQEQQKAAL AREECLRLTELLGESEHQLHLTRQEKDS IQQSFSKEAKAALQ AQOREQELTQKIQMEAHQDKTENEQYLLLSQNTFLTKLKEE CCTLAKKLEQISQKTRSEIAQLSQEKRYTYDKLGLQRRNEEL EEQCVQHGRST*
63	802	3	334	SYFVWVNSPLTAEVPELLAAAGFFHTGHQDKVRCFFCYGGLQ SWKRGDDPWTEHAKWFPS CQFLLRSGRDFVHVSQETHS QLLG SWDPWEEPEDAAPVAPSVPASGYPELPTPRREVQSESAQEPGG VSPAQAQRAWVLEPPGARDVEAQLRRLQEERTCKVCLDRAVS IVFVPCGHLVC\AECAPGLQLCPT\CRSPCGPLRPLFWVP
64	803	70	456	MCSYREKKAEPQELLQLDGYTVDYTDQPGLGEGRAFFNAVKE GDTVIFASDDEQDRILWVQAMYRATGQSHKVPPTQVQKLNK GGNVPQLDAPISQFYADRAQKHGMDEFISSNPCNFDHASLFEM *
65	804	2	1376	KQLIVLGNKVLDLPPQDAPGYRQRLRERLWEDCARAGLLAPGH QGPQRPVKDEPQDGENENPPNWSRTVVVDVRLISAKTGYGVEE LISALQRSWRVYRGDVYLVGATNAGKSTLFNTLES DYCTAKGS EADIRATISWPVPGTTLNLLKFPICNPTPYRMFKRHQRLKKDST QAEDLSEQEQNLNVLKKHGYVVGVRGRTFLYSEEQKDNIPF EFDADSLAFDMENDPVMGTHKSTKQVELTAQDVKDAHWFYDTP GITKENCILNLLTEKEVNIVLPTQSIVPRTFVLKPGMVLFLGA IGRIDFLQGNQSAWFTVVASNILPVHITSLDRADALYQKHAGH TLLQIPMGKKERMAGFPPLVAEDIMLKEGLGASEAVADIKFSS AGWVSVPNPFKDRHLRLGYTPEGTVLTVRPPLLPYIVNIKGQR IKKSVAYKTKKPPSLMYNVRKKKGKINV
66	805	1	874	STVASMMHROETVECLRKFENARRKLKGAILTTLVSRNFSAAK SLLNKKSDGGVKPQSNKNSLVSPAQEPAPLQTAMEPQTTVVH NATDGIKGSTESCNTTTEDEDLKAAPLRTGNGSSVPEGRSSRD RTAPSAGMQPQPSLCSAMRKQEI IKITEQLIEAINNGDFEAY TKICDPGLTSFEPEALGNLVEGMDFKFYFENLLSKNSKPIHT TILNPHVHVIGEDAACIAYIRLTQYIDGQGRPSNPAKSEE\TR VWH\RR\DGKWLNVHYHCSGAPCPHRCSELSHRGF



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67	806	3	1714	LPKNVVFVLDSSASMVGTKLRQTKDALEFTILHDLRPQDRFSII GFSNRIRKVKDHLISVTPDSIRDGKVIYIHMSPTGGTDINGAL QRAIRLLNKYVAHSGIGDRRVSLIVFLTDGKPTVGETHTLKIL NNTREAARGQVCIFTIGIGNDVDFRLLLEKLSLENCGLTRRVHE EEDAGSQLIGFYDEIRTPLLSDIRIDYPPSSVVQATKTLFPNY FNGSEII IAGKLVDRKLDHLHVEVTASNSKKFIILKTDVPVRP QKAGKDVTSRPPGGDGEEDTNHIERLWSYLTTKELLSSWLQS DDEPEKERLRQRAQALAVSYRFLTPFTSMKLRGPVPRMDGLEE AHGMSAAMGPEPVVQSVRGAGTQPGPLLKKPYQPRIKISKTSV DGDPHFVVDFPLSRLTVCFNIDGQPGDILRLVSDHRDSGVTVN GELIGAPAPPNGHKKQRTYLRTITILINKPERSYLEITPSRVI LDGGDRLVLPNCQSVVVGSGWGLEVSANANVTVTIQGSIAFV ILIHLYKKPAPFQRHHLGFYIANSEGLSSNCRVFCESGILIQE LTQQSVAVAGR
68	807	2	841	FFLEQVSQYTFAMCSYREKKSEPQELMQLEGYTVDYTDPHPG QGGCMFFNAVKEGDTVIFASDDEQDRILWVQAMYRATGQSYKP VPAIQTKLNPKGGLHADAQLYADRFQKHGMDEFISANPCKL DHAFLFRILQRQTLDHRLNDSYSCLGWFS PGQVFVLDEYCARY GVRGCHRHLCYLAELMEHSENGAVIDPTLLHYSFAFCAS \H GNRPDGIGTVSVEEKERFEEIKERLSSLENQISHFRYCFPF RPEGALKATLSLLERVLMKDIA
69	808	2	757	DGLLHEVLNGLDRPDWEEAVKMPVGILPCGSGNALAGAVNQ GGFEPALGLDILLNCSLLLCRGGGHPDLLSVTLASGSRCSF LSVANGFVSDVDIQSERFRALGSARFTLGTVLGLATLHTYRGR LSYLPATVEPASPTPAHSLPRAKSELTLTPDPAPPMASPLHR SVSDLPLPLPQALASPGSPEPLPILSLNNGGPELAGDWGGAG DAPLSPDPQLSSPPGSPKAALHSPV*KKAPVIPPDM
70	809	3	530	KGVPPTLLMAAGSFYDILAITGFNTCLGIAFSTGSTVFNVLRGV LEVVGIVATGSVLGFFIQYFPSRDQDKLVCKRTFLVLGLSVLA VFSSVHFGFPGSGGLCTLVMAFLAGMGWTSEKAEVEKIIIAV DIFQPLLFLGLIG \AEVSI \SSLRPETVGLCVATVGI \AVLIRI FDYIF
71	810	228	541	LLKEVVVQASPVCKTCCSQLVTRTPVTFTEVQNV /CRCSAGYLI SVCSTSSDHNQCYAGTASLALLWIGGILKGCLLWKQFRWTER SHWNFGYWALWSPGNGNGC
72	811	173	404	ICTSTYLQIFPGKPSCFMCKGRMLCIYFILWYLGHYTSLHWNW CRYISDPNVD /ACPDPRNAEVSMHTV PALMELID
73	812	2	586	LES LPGFKEIVSRGVKVDYLTDPDFPSLSYPNYTTLMTGRHCEV HQMIGNYMWDPPTNKSFDIGVNKDSLMPLWNGSEPLWVTLLTK AKRKVYMYWPGCEVEILGVRPTYCLEYKNVPTDINFANAVSD ALDSFKSGRADLAATYHERIDVEGHYGPASPQRKDALKAL \VD TVLKYMTKWIQERGLQDRLNVII

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74	813	2	348	ARDFHPKQTLDFLRSDMANSKITEEVKRSIAQQYLDLTVA/LE QVDPDAEVDAA PSTTSSCGH*DSHAGS*RVLSLLGD*GPA*TG ANSMAGKLLLVAVLGFDPDFWKGELSDPAFK
75	814	2	366	KQSGDVTCTNCTDGR LAPSC LTCVGH C IFGGYCTMNSKMMPECQ SPPHMTGPRCEEHVFSQHOPGHITSILIPML*LLLLVLVAGVI FCHKRRVQGA KGFQHQRTMGAMNAQIANPTYKMY
76	815	420	681	TVENAGRWL*EEAETQAELERLERVRNLHIRELKRINNEDNSQ FKDHPTLNER YLLLHL LGRGGFSEVYKVMYGLFWFFYT NVARI
77	816	37	428	MCEEFLVMGKGCSCVF*ILLSNPQMWWLNDSPETDNREQSPS QENIDRVSD/MAFVPSAWTASGGVAVGNLGESESGRTGGVRAET LAPRLQV*PAHLRGHPRSNRGQGRPPWKAGLKGKQCEVLFRFA AF
78	817	1	358	FRAMFLAVQHDCRPMDKSAGSGHKSEEKREKMKRTLLKDWKTR LSYFLQNSSTPGKPKTGKSKQQA FIK*VENPELANINS*LLN *KGEL**A*ANIQNLSCRPSPEEAQLWSEAFDE
79	818	1	169	GFFNFSSPKLKGWKINSSLVLEIRKNILRFLDAERDVSVVKSS FPSKDARHSSVHR*FTQLHWGPPSHTPARP*RGFFNFSSPKLK GWKINSSLVLEIRKNILRFLDAERDVSVVKSSFPSKDARHSSV HR
80	819	55	310	RIDDQQELKRV T*YSQKEYTKKKLHKKCNIIQADIKPDNILDN ESITILKLSDFGSASHVADNDITPSSSQTTSAASSPPTLR
81	820	1	134	SSKPWD*SLAPKHSG*TKNMDCYCI IPTCIGRERCYGT CIGDT V
82	821	187	360	NSSKLVMEHQWKYLRRNYQRLNRLITLIGSCGVL*LISTI PTSRLKFLKETGHGTPMEEIPEEELSEDVEQIDHADRELRRGQ NLRCKGIHRLPTHIQVGQN
83	822	208	723	KWMLLHSFKIFCLSLYPQL*CPFEFFSHSATIFHELVYKQTKI ISSNQELIYEGRRVLVLEPGRLAQHF PKTTEENPIFVVSREPLN TIGLIYEKISLPKVHPRYDLGDASMAKAITGVVCYACRIAST LLLYQELMRKGIRWLI ELIKDDYNETVHKKTEVVITLGLVSR
84	823	1	314	GTRKMGPTVSPICLPGTWGDYNLMDGDLGLISGWGRTEKRDRA DRLKAGRSPAAG*RKWEPGRGDPTWESEBEDVHKS KWTRCVDE KGA*C*TDNKRPLRCGVT
85	824	3	302	HELENLIKSAHSYSLY*G*YLHGA*TAEPEASFPRRGWNRQA GAAGSRMNFRRPGVLSSRQLGLPGPPDGPDPYTVYYPFHRLAMVT AASRLEREHLTHL
86	825	87	422	PVPLPHPILEVCPGQ*EPQSAISLTA FQVQAGASRASPGPPAP SSSKPGRKAKVASPCPDRPAPPPT*PRPAAAPGSESSPRPPRP RTGRRQQR AHARRAAARTAPWRPSC
87	826	3	289	HEGRRRGWASASQRF LRNWAFLTPSKVRR LKGQKAFGKLP SHS DTSLTSDLG FHHRFNPNASSSFKPSGTFKFAIQYGTGRVDGILS EDKLTVSGL
88	827	1	101	GRNIMHYPNGHAICTIANGHCITIL*NSHNTIKVWV

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89	828	1	535	INLGNTCYMNSVI*ALFMATDFRRQVLSLNLNGCNSLMKKLQH LFAFLAHTQREAYAPRIFFEASRPWPFTPRSQQDCSEYLRFL LDRLHEEEKILKVQASHKPSEILECSETSLQEVASKAAVLTETP RTSDGEKTLIEKMFGGKLRTHIRCLNCTSTSQKVEAFDLSLA FWPSSS
90	829	1	434	ARDDPRVRLSLSPNFF*LASKLGKQWTPLIILANSLSGTNMG
91	830	3	782	MHRIKLNDRMTFPEELDMSTFIDVEDEKSPQTESCTDSGAENE GSCHSDQMSNDFSNDGVDGICLETNSGTEKISKSGLEKNSL IYELFSVMVHSGSAAGGHYACIKSFSDEQWYSFNDQHVSRIT QEDIKKTHGGSSGSRGYSSAFASSTNAYMLIYRLKDPARNAK FLEVDEYPEHIKNLVQKERELEEQEKQRQREIERNTCKIKLFC LHPKQVMMED*IEVHKDKTLKEAVEMAYKMMDL EEVIPDCCR L
92	831	2	604	SVMPVPALCLLWALAMVTRPASAAPMGGPPELAQHEELTLLFHG TLQLGQALNGVYRTTEGRLTKARNSLGLYGRITIELLGQEVSRG RDAAQELRASLLETQMEEDILQLQAEATAEVLGEVAQAQKVL RDSVQRLEVQLRSAWLGPAYREFEVLKAHADKQSHILWALTGHV QRQRREMVAAQOHLRQIQERLHTAALPA
93	832	16	690	ITSVDPRVRGNASTGYGKIWLDDVSCDGDSDLDWSCRNSGWN NDCSHSEDVGVICSDASDMELRLVGGSSRCAGKVEVNVQGA VG ILCANGWGMNIAEVVCRQLECGSAIRVSREPHFTERTLHILMS NSGCAGGEASLWDCIRWEWKQTACHLNMEASLICS AHRQPRLV GADMPCCSGRVEVKHAHTWRSVCDSDFSLHAANVLCRELNCGDA ISLSVGDHFG
94	833	108	727	SNYPSSRFRVAGITGVKLGMRSIPIATACTIYHKFFCETNLDA YDPYLIAMSSIYLAGKVEEQHLRTRDI INVSNNRYFNPSGEPL E LDSRFWE LRDSIVQCELLMLRVLRVQVSFQHPHKYLLHYLVSL QNWLNRHSWQRTPVAVTAWALLRDSYHGALCLRFQAQHI AVAV LYLALQVYGVEVPAEVEA/DEAVGWQIYAMDTEIP
95	834	118	376	RGSRHAVHGWAFGLLFINKESVVMAYLFTTFNAFQGVFI FV FH CALQKKVRSRRGPGSQPPLETFPGYPGEGGEGGDS GAPSSPQ
96	835	3	333	ARKDDLPPNMRFHEEKRLDFEWTLKAG*EKG*PSK*NKGWEGQ E***TVRD*GIS**VKPQHLS*\ALQMALKRVTLLSSWNCLE DFDQIFWGQKSALAGQWFPEVSIIP
97	836	740	951	GKQQRETLRRPSPTISVQRAGSPEHSSASH*HSPCPAPGQRV L PTALCTLMTSKHFGCPLAGQGRAVTL

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98	837	81	1503	GVCGLPRFCGS IILCHYEMSSSLGASFVQIKFDDLQFFENC GGG SFGSVYRAKWISQDKEVAVKKLLKIEKEAEILSVLSHRNIQF YGVILEPPNYGIVTEYASLGSLYDYINSNRSEEMDMDHMTWA TDVAKGMHYLHMEAPVKVIHRDLKSRNVVIAADGVLIKICDFGA SRFHNHTTHMSLVGTFPWMAPEVIQSLFVSETCDTYSYGVVLW EMLTREVPFKGLEGLQVAWLVEKNERLTIPSSCPRSFAELLH QCWEADAKKRPSFKQIISILESMSNDTSLPDKCNSFLHNKAEW RCEIEATLERLKKLERDLSFKBQELKERERRLKMWEQKLTEQS NTPLLLPLAARMSEESYFESKTEESNSAEMSCQITATSNNGEGH GMNPSLQAMMLMGFGDIFSMNKAGAVMHSGMQINMQAKQNSSK TTSKRGRKKVNMA LGFSDFDLSEGD D D D D D D G E E E Y N D M D N S E
99	838	185	328	MLWETGCSAACRVTVSPTVTFATFSTRGIDAMRPGPSFLWRQQ LSQG*
100	839	1	348	PTLGDQPDLSITRASRPKLCTRKNCNPLTITVHDPNSTQ*YY GMSWELRFYIPGFDVGTMTFTIQKILVSWSPPKPIGPLTDLGDP MFQKPPNKVDLTVPPPFLVIKDTLQKFEKI
101	840	1	416	SLNNVTLPQAKTEKDFIQLCTPGVIKQEKLGTVYQASSPGAN MIGNKMSAISVHGVSTSGGQMYHYDMNTASLSQQ*DQKPIFNV IPPIPVGSSENWNRCCQSGDDNLTSLGTLNFPGRTVSFSFEMES RSV AQAGVQ
102	841	105	354	RHTQECRCPTHITHTHSHTHSHTHSHSHSHTTPRCSTHTQPP HAQAPALC*S*EDRGQPTWKLCARPRLKVIKEGGWLG
103	842	171	347	NYSLSVYLVRQLTAGTLLQKLRAKGRNPDHSRALSE*HLSSL PHLIWIQVFLALQPS
104	843	2	690	ATYIVDFGFSTTFREGQMLTAFCGMYPYVAPERSLGQACQ*PA RDIQSLSVILYFRNTVGRRTARTLPFYS/AEASKLQEKILTGRY HAPPLALQLDSL/IKLLMLNARKCPSL*LMKNPWWKSSQKMP LIPYEEPL/RGPPQTIQLMVAMGFQAKNISVAIERKFNYPMA TYLILEHTKQERKCSTIRELSLPPGVPTSPSPSTELSTFPLSL MRAHREPAFNVQPPEESQ
105	844	2	777	AKQELAKLMRIEDPSLLNSRVLLHAKAGTTIARQGDQDVSLH FVLWGCLHVVYQRMIDKAEDVCLFVAQPGELVGLAVLTGEPLI FTLRAQRDCTFLRISKSDFYEIMRAQPSVVLSSAHTVAARMSP FVRQMDFAIDWTAVEAGRALYRCSSHRAAQARPRGGDLGVVRP C*PPRPLRQGRSDCTYIVLNGRLRSVIQRGSGKKELVGEYGR GD LIGVVSATPTH*PLAFSRPVPRQLTRIIPGNPGSGEVFPGA
106	845	3	709	HASGWTPGTTQTLGQGTAWDTVASTPGTSETTASAEGRRTPGA TRPAAPGTGSWAEGSVKAPAPIPESPPSKSRSMSNTTEGVWEG TRSSVTNRARASKDRREMTTTKADRPREDIEGVRIALDAKKV LGTIGPPALVSETLAWELPQATPVSKQQSQSIGETTPAAGM WTLGTPAADVWILGTPAADVWTSMEAASGEGSAAGDLDAATGD RGPQATLSQTPAV*PWGPPG

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107	846	3	406	AGTSGTGDTGPGNTAVSGTPVVS PGATPGAPGSSTPG EADIGN TSFGKSGTPTVSAASTTSSPVSKHTDAASATAVTISGSKPGTP GTPGGATSGGKITPGIA*PTLDQKSPCFSGYGGYFPVNP HQNP CADSL
108	847	1	565	RAHRCCLPLPSLSCEIQIGFS*SSIFPGQ*ACPCSCCRSCRRN WPQSPRCPHPPAPCSLLLSSCLPPPLSCSWRGTS GKPPSQSP AASRSMRPRCSPTSSSLRGASCRGPGGSAPAAASGPRCRGCSR SPRRCRSRGCAAASPPRSQRRSPPLSPPPFPTSGTLLLTSRF GSATRE*SSPRPRPRP
109	848	2	987	DDVPPFAFDLYDVPPGLRRPGPGTLYDVPRERVLPPEVADGGV VDSGVYAVPPPAEREAPAEGRKLSASSTGSTRSSQSASSLEVA GPGREPLELEVAVEALARLQQGV SATVAHLDDLGSAGATGSW RSPSEPQEPLVQDLQA AVAVQSAVHELLEFARS AVGNAHTS DRALHAKLSRQLQKMEDVHQT LVAHGQALDAGRGGSGATLEDL DRLVACSRAVPEDAKQLASFLHGNASLLFRRTKATAPGPEGGG TLHPNPTDKTSSIQSRPLSPPKFTSQDSPDGQYENSEGGWME DYDYVHLTGRRSF*KTQKELLGKRAA
110	849	84	372	MATDEENVYGLEENAQSRQESTRRLILVGR TGAGKSATGNSIL GQRRFFSRLGATSVTRACTTGSRWDKCHVEVVDTPDIFSSQV SKTDPGCEERX*
111	850	2	47	TLGLRSLTKEGGGGGDVAAFVGTGAAASRALGQCGQLQKLIV IFIGSLCGLCTKCAVSNDLTQQEIQTP EIIQQRNA*CDSRVTF NEGGRWWG
112	851	1192	1040	FFFLVETRFHHIGQAGLELLTSLIK*SARLGLPKCWDDRREPP YLAGFMI
113	852	791	362	RRSPPPPAPPLPSPLSPPPRAPVSPASTMPILLFLIDTSASMN QRSHLGTTYLD TAKGAVETFMKL RARDPASRGDRYMLVTFEPP PYAIKAGWKENHATFMNELKNLQAEGLTTLGQSLRTAFD LNL NRLVTGIDNYQVVG
114	853	812	348	NCRTYVFCFVLVFRLLFLHGSPLSPSLLSRAGLLCGSAENPTP FLCGITMAAGVSL LALVVRVILSTAILCPSGASRRQRSSEVEW GTDSGVYRLYCWRVGFLGPGGELRLGLSEARGGRVWGRGEKRC RVWAVRSLRKGFGSVAALRRGIWAG
115	854	93	170	VTPTPPQYYTCSCVLGFIACSI FLQMSLKPKVMLLTVALVACL VLFNLSQCWQRDCCSQGLGNLT EPGTNR*GPAAVSWASLPAP SSCR
116	855	1	183	GKAGGAAGLFAKQVQKKFSRAQEK*TRRFGKTCQPEERAREER QEGPEIEFGFSFSLSLY

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117	856	53	2400	PKRLFLFQDVNTLQGGGQPVVTPSVQPSLQPAHPALPQMTSQA PQPSVTGLQAPSAALMQVSSLDHSAVSGNAQSFQPYAGMQAY AYPQASAVTSQLQPVRLYPAPLSQPPHFQSGDMASFLMTEA RQHNTETIRMAVSKVADKMDHMLTKVEELQKHSAGNSMLIPSMS VTMETSMIMSNIQRIIQENERLKQEILEKSNRIEEQNDKISEL IERNQRYVEQSNLMMEKRNNSLQTATENTQARVLHAEQEKAKV TEELAAATAQVSHLQLKMTAHQKKETELQMLTESLKETDLLR GQLTKVQAKLSELQETSEQAQSKFKSEKQNRKQLELKVTSLEE ELTDLRVEKESLEKNLSERKKKSAQERSQAEEIDEIRKSYQE ELDKLRQLLKKTRVSTDQAAAEQLSLVQAELOQTQWEAKCEHLL ASAKDEHLQQYQEVCAQRDAYQQKLVLQLEKSVCF\CLALQA QITALTQNEQHIKELEKNKSQMSGVEAAADPSEKVKKIMNQ VFQSLRREFELEESYNGRTILGTIMNTIKMVTILQLLNQEQEK EESSEEEEEKAEERPRRPSQEQSASASSGQPQAPLNRERPES PMVPSEQVVEEAVPLPPQALTTSQDGHRRKGDSEAEALSEIKD GSLPPELSCIPSHRVLGPPTSIPPEPLGPVSMDECEESLAAS PMAAK\PDNPSGK\VCVQGK*APDGPTYKE\SSTRLFPGFQDP E\EGDPLALGLE\SPG\EPQPPQLQGKVDVH*VPPVPHKGAFQ EQEGRFPQFCRE
118	857	1	791	SETAQQIIDRLRVKLAKPEPGANLFLMAVQDIRVGGQRQSNASYQ YTLLSDDLALREWEPKIRKKLATLPELADVNSDQQDNGAEMN LVYDRDTMARLGIDVQAANSLLNNAFGQRQISTIIYQPMNQYKV VMEVDPRYTQDISALEKMFVINNEGKAIPLSYFAKWQAPANAPL SVNHQGLSAAALTISFNLPTGKSLSDASAAIDRAMSQLGVPSTV RGSFAGPAQVFQETMNSQVILIIAAIATVYIVLGIPIERYVHP PTILL*RPGANLFLMAVQDIRVGGQRQSNASYQYTLLSDDLAL REWEPKIRKKLATLPELADVNSDQQDNGAEMNLVYDRDTMARL GIDVQAANSLLNNAFGQRQISTIIYQPMNQYKVMEVDPRYTQD ISALEKMFVINNEGKAIPLSYFAKWQAPANAPLSVNHQGLSAA LTISFNLPTGKSLSDASAAIDRAMSQLGVPSTVRGSFAGPAQVF QETMNSQVILIIAAIATVYIVLGIPIERYVHPPTILL
119	858	3	417	IITPDAMGCQKDIAEKIQKQGGDYLFVAVKGNQGRNLNKAFFEEKF PLKELNNPEHDSYAISEKSHGREERLHIVCDVPDELIDFTFE WKGLKKLCVAVSFRSIIAEQKKEPEMTVRYNIS*LGIAGDISV TAISGTDD
120	859	2	373	HYLKMLTQARREVIIANAYFFPGYRFLHALRKAARRGVRIKLI IQGEPDMPIVRVGARLLYNYLVKGGVQVFYERRRPLHGKVALM DDHWATVGSSNLHPVS*SGNLQANVILHVLVPTLNP
121	860	286	495	CWSKSAAFHSHKLATTCIVPVCAGHCSAAW*SLRPIEALAKEV RELK*HTR*LLNPATTRELTSLGRNLNRLKSERERYDKYRTT LTDLTHSLKTPLAVLQSTLRSLSRSEKMSVSDAEPVMLEQISRI SQQIGYYLHRAMRGGTLLSRELHPVAPLLDNLTSALIKGKPR KGGNVTVPFPTAMYRDGH

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122	861	2	725	GNTVMFQHLMQKRKHTQWTYGPLTSTLYDLTEIDSSGDEQSLL ELIITTKKREARQILDQTPVKELVSLKWKRYGRPYFCMLGAIY LLYIICFTMCCIRPLKPRNTNNRTSPRDNLLQKQLLOEAYMT PKDDIRLVGELVTVIGAIILLVEVPDIFRMGVTRFFGQTILG GPFHVLIITYAFMVLVTMVMRLISASGEVVPMSFALVLGWCNV MYFARGFQMLGPFTIMIQKMIFGDL
123	862	1	135	EKAAAANIDEVQKSDVSSTGQGVIDKDALGPMMLVAHLHFS VF
124	863	2	364	LEVPSSEVTPLGFAMQATKTLRLTCCLQEFNIMEKNKGWALLG GKDGHLQGLFLLANALLERNQLLAQKVMYLLVPLLNRGNDKHK LTSAGFFVELLRSPVAKRLPSIYSVARFKDWLQD
125	864	1	374	RPAPAPSAAPEEAPSP\GVKGRGMARRVPAPVWGGAGGGTKS ARRAAAPDTERSEEGRAVKEAYPSSRQPPPPSP*PLRCARR CHPNLAPSMPI SNREGKGKRREEKIRPLSPASTHTSARA
126	865	3	364	LQGVHGSSSTFCSSLSDDFDPLEYCSKPGDPQRVDMQPSVTSR PRSLDSEVPTGETQVSSHVHYHRHHHYKKRFQRHGRKPGPE TGVPPQSRPPIPRTPQPEPPSPDQOVTRSNSAAP
127	866	2	250	MADPDPRYPRSSIEDDFNYGSSEASDTVHIRMAFLRRVYSILS LQDLLATVTSTDNLAFEDGRTDWLQRPDCVSFKIHVLEPM
128	867	194	375	AGMSVVVVPPIGSSYLGLISQEHFPNEFTSGDGKKAHQDFGYF YGSSYVAASDSSRTPGL
129	868	104	339	VAAALTFLFPQQLSPPGAWGLGLSACFCCAEGFSRLNQQVLSSS LLLSLRTNCPCKYSLDNLKLTTPRRDVPTYPKVR
130	869	2	360	RDDACLYSPASAPEVITVGATNAQDQPVTLGLTGNFGRCDL FAPGEDII GASSDCSTCFVSQSGTSQAAHVAGIAAMMLSAEP ELTLAELRQRLIHFSKDVINEAWFPEDQRVLT
131	870	2	105	LEIKFLEQVDQFYDDNFPMEIRHLLAQWIENQDW
132	871	2	466	EAGDADEDEADANSSDCEPEGPVEAEPPQEDSSSQSDSVEDR SEDEDEHSEEEETSGSSASEESEESESEDAQSQSQADEEEED DDFGVEYLLARDEEQSEADAGSGPPTPGPTTLGPKKEITDIAA AAESLQPKGYTLATTQVKTPIPLLL
133	872	1	354	LKNLRELLLEDNQLPQIPSGLPESLTELSTIQTNIYNTKEGI SRLINLKNLYLAWNCYFNKVCEKTNIEDGVFETLTNLELLSLS FNSLSHVPPKLPSSLRKLFLSNTQIKYISEED
134	873	59	184	MRSQALGQSAPSLTASLKLPSLRGSGFPVPCPNAGRTSPLG*
135	874	1	210	LLCVCLPVGACPSLSLLTAPLNQLMRCLRKYSRTSPSPLLSV PSEIVDFEPGPVFRGSWALLSWSTRP
136	875	131	254	QTPDKKQNDQRNRKRKAEPYETSQGSNNFVSTKVLNSNVLR
137	876	84	504	YFIKGMVELVPASDTLRKIQVEYGVTSFKDKPLAEWLKRYN PSEEEYEKASENFIYSCAGCCVATYVLGICDRHNDNIMLRSTG HMFHIDFGKFLGHAQMFGSFKRDRAPFVLTSDMAYVINGGKPTIRFQLFVDL

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138	877	3	215	PSPLPSLSLPPPVAPGGQESPSPHTAEEVESEASPPPARPLPGE ARLAPISEEGKQQLVGRF\QVTSSK\NRLSLFPCSQHPPLSLV LQNLPPLSSSLQRAQIQRTV/PGGGPETREALAESDRAAEG LGA GVEEEDDGKEPQVGGSPQPLSHPSVVMNYSYSSLCLSSEES ESSGEDEEFWAE LQSLRQKHLSEVETLQTLQKKEIEDLYSR LG KQPPPGIVAPAAMLSSRQRRLSKGSFPTSRNSLQRSEPPGPG ETA/GHPASIFSLRPLSVDCFSPPGGLPRGNRPPLPTSPFLT *CSPSPHTAEVESEASPPPARPLPGEARLAPISEEGKQQLVGR FPSDFIQGTG
139	878	1	337	RRFVSQETGNLYIAKVEKSDVGNVTCVVTNTVTNHNKVLGPPTP LILRNDGVMGEYEPKIEVQFPETVPTAKGATVKLECFA LGNPV PTIIWRRADGKPIARKARRHKS RVGK
140	879	72	917	MLRTCIVLCSQAGPRSRGWQSLSPDGGAFHLKGTGELTRALLV LRLCAWPPPLVTHGLLLQAWSRRLLSRLSGAFLRASVYQGFVA GETAEVKGKCVQQLRTLRLPLAVPTEEEPDSAASGEAWYE GNLGAMLRCDLSRGLLEPPSLAEASLMQLKV TALTSTRLC KE LASWVRRPGASLELSPERLAEAMDSGQNLQVSC LNAEQNH LR ASLSRLHRVAQYARAQHVRLLVDAEYTS LNPALSL LVAALAVR WNSPGE GGPVWNTYQACLKDTF*
141	880	219	308	PHHRIAGDTAIDKNIHQSVSEQIKKNFAK
142	881	182	317	QMTNPFFLCFTTMMISNCNFFKGGPPGPGEKGD RGPTGESGPRG FP
143	882	177	341	NGIIASFRLRTFIFCFIHIQGCQAGQTIKVQVSFDLLSLMFTF VSPCTNDLIIH
144	883	3	1441	KL SVNHRRTLTKLMHTVEQATLRISQS FQKTTEFDNSTDIA LK VFFFD SYNMKHIHPHMNDGDYINIFPKRKAAYDSNGNVA V AFLYYKSIGPLSSSDNFLKPNYDNSEEEERVIS SVISVM SSNPPTLYELEKITFTLSHRKVTD RYRSLCAFWNYSPTMNGS WSSEGCELTYSNETHTSCRCNHLTHFAILMSSGPSIGIKDYNI LTRITQLGIIISLICLAICIFTFWFFSEIQSTRTTIHKNLCCS LFLAELVFLVGINTNTNKLFC SIIAGLLHYFFLAFAWMCIEG IHLYLIVVGVYIN KGF LHKNFYIFGYLSPAVVVGFS AALGYRY YGTTKVCWLSTENNFIWSFIGPACLIILVNLLAFGVIIYKVFR HTAGLKPEVSCFENIRSCARGALALLFL LGTTWIFGV LHVVHA SVVTAYLFTVSNAFQGMFIFLFLCVLSRKIQEEYYRLFKNVPC CFGCLR
145	884	1	429	GTREAAAPSRFMFLFLLTCELAEEVAEEVEKSSDGPAAQEPT WLTDPVPAAMEFIAATEVAVIGFFQDLEIPAVPILHSMVQKFGP VSGISTDSEVLTHYNITGNTICLFR LVDNEQLNLEDEDIESI DATKLSRFIEINSL
146	885	1	156	DETSGLIVREVSIETSRQOVEELFGPEDYWCQCVAWSSAGTTK SRKAYVRIA
147	886	1	121	GTRSIHVKLDV GKLHTQPKLAAQLRMVDDGSGKVEGLPGI



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148	887	128	652	XCGEDGSFTQVQCHTYTGYCWCVTPDGKPISGSSVQNKTPVCS GSVTDKPLSQGNSGRKDDGSKPTPTMETQPVFDGEITAPT LW IKHLVIKDSKLNNTNIRNSEKVVSCDQERQSALEEAQQNPREG IVIPECAPGGLYKPVQCHQSTGYCWCVLVD TGRPLPGTSTRYV MPSX*
149	888	128	273	VLQLIKSQKFLNKLVLVETEKEKILRKEYVFADSKVSDSKLL KWA VR
150	889	1	948	RRLSLLDLQLGPLGRDPPQECSTFSPTDSGEEPQQLSPGVQFQ RRQNQRRFSMEDVSKRLSLEMDIRLPQEFLLQKLQMESPDLPKP LSRMSRRASLSDIGFGKLETYVVKLDKLGEGTYATVFKGRSKLT ENLVALKEIRLEHEEGAPCTAIREVSLLKNLKHANIVTLHDLI HTDRSLTLVFEYLDSDLKQYLDHCGNLSMHNKVRPRGQGP I LAATCPEAQCGDPLSPPGIRLLRWLKP SHVGKRERAMPSTSP GTGLSALPQEQHTTVCHCLAVGIKPTLNSEHQFPSLSNGSVSY LPKCREASGEARGYE
151	890	3	108	HERHEPSPTALAFGDHPVQPKQLSFKIIQVNDN
152	891	2	208	ARGPSLLSEFHPGSDRPQERRTSYEP IHPGPSPVDHDSLESKR PRLEQASDSHYQGHITGESLPGRVH
153	892	1	116	GTRKEEFSAEENFLILTEMATNHVQVLVEFTKKLP G I F
154	893	74	661	HTHKLIVAPRPLPPTSQWPRDAGRQASGGLPSLSLSTGPPKGRD GLARGHPAEWLAGSPGNNSTQGSLLPQLDLYAGALFVHICLG WNFYLSLITLTLGITALYTIAGMVPAAGRSTQGTCKGVRPPPP TGPREQPRKWPQEPQKFLPVSLLPGARAPSSNLASTGRGPC CNLHGRPADAHGGGGCHPDNQR
155	894	55	312	MVNHSLOETSEQNVILQHTLQQQQQMLQOETIRNGELED T QTK LEKQVSKLEQELQKQRESSAEKLRKMEEKCESAAHEADLKRQK *
156	895	38	185	VCPKWCRFLTMLGHCCYFWHVWPAS*ALSAGPTPTSRSFSPSP LRSIST
157	896	37	462	MRGPPVLLLQAAPMECPVPQGI PAGSSPEPAPDPPGPHFLRQE RSFECRMCGKAFKRSTLSTHLLIHS DTRPYPCQFCGKR FHQK SDMCKHTYIHTGEKPHKCQTQREPTMVLSPADKTNVKA AWX*
158	897	3	175	HEQLTNNTATAPSATPVFGQVAASTAPSLFGQQTGITASTAVA TPQVISSRFINLDF
159	898	187	677	VSVEFKNCPMY*ICIFLTKMFCVLII\*NKF*VHKKPLQEVEIA AITHGALQGLAYLHSHTMIHRDIKAGNILLTEPGQVKLADFGS ASMASPANSFVGTPYWMapevILAMDEGQYDGKVDVWSLGITC IELAERKPPLFNMNAMSALYHIAQNESPTLQSNW

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160	899	2	1060	RHARPGGGGHSNQRKMSLEQEEETQPGRLGRRDAVPAFIEPN VRFWITERQSFIRRFLOWTELLDPTNVFISVESIENSROLLCT NEDVSSPASADQRIQEAWKRSLATVHPDSSNLIPKLFPPAAFL PFMATPVFLSMTPLKGIKSVILPQVFLCAYMAAFNS INGNRSY TCKPLERSLLMAGAVASSTFLGVIPQFVQMKYGLTGPWIKRLL PVIFLVQASGMNVMSRSLESIKGIAVMDKEGNVLGHSRIAGT KAVRETLASRIVLFGTSALIPVFTYFFKRTQYFRKNPGSLWI LKLSCTVLAMGLMVPFSFSIFPQIGQIQYCSLEEKIQSPTEET EIFYHRGV
161	900	3	564	HASGRLEVFYNGTWGSVGRNRNITTAIAGIVCRQLGCGENGVS LAPLSKTGSGFMWVDDIQCPKTHISIWQCLSAWERRISSPAE ETWITCEDRIRVRGGDTECSGRVEIWHAGSWGTVCDSDWDLAE AEVVCQQLGCGSALAALRDASFGQGTGTIWLDDMRCKGNESFL WDCHAKPWGQSDCG
162	901	1099	2	LGDFPQPQRQRRPGASDLPPHLAGARQWEVRFRRHLPARTLPP SLRMPEGPPELHLASQFVNEACRALVFGGCVEKSSVSRNPEVPF ESSAYRISASARGKELRLILSPLPGAQPQQEPLALVFRFGMSG SFQLVPREELPRHAHLRFYTAPPGPRLALCFVDIRRFGRWDLG GKWQPGRGPVQLQEYQQFRENVLRLNADKAFDRPICEALLDQR FFNGIGNYLRAEILYRLKIPFEKARSVLEALQQHRPSPELTL SQKIRTKLQNPDLLELCHSVKPEVVQLGGRGYGSESGEEDFAA FRAWLRICYGMPGMSLQDRHGRTIWFQGDGPGLAPKGRKSRKK KSKATQLSPEDRVEDALPPSK
163	902	3	335	LTWSACYWRDILRIQLWIAADILLRMLEKALLYSEHQNISNTG LSSQGLLIFAEILPAIKRTLARLLVIIASLDYGIKPHLGTGM HRVIGLMMLLYLIFANAESVIRVIG
164	903	2	135	FFFEMESRSAAQAGVQWCNLGSLQALPPRFTPFSCLSLPSWD Y
165	904	74	645	YECEELAKKLENSQRDGISRNKLALAELEYEDEVCKSSKSNRP KATVFKSPRTPPQRFYSSEHEYSGLNIVRPSTGKIVNELFKEA REHGAVPLNEATRASGDDKSKSFTGGGYRLGSSFCRSEYIYG ENQLQDVQIILLKWSNGFSLDDGELRPYNEPTNAQFLESVKRG VTLIACMPEIQQLMLEIF
166	905	14	1257	WPCGAAPGLTHASERMFTLTMTIQALAPVMGWDRKPLKMFSS EEMRGLHHHHKCLTKILKVEGQVPDLPSCLPLTDNTRMLASIL INMLYDDLRCDPERDHFRIKICEEYITGKFDPQDMDKNLNAIQ T VSGILQGPFDLGNQLLGLKGVMMEMVALCGSERETDQLVAVEA LIHASTKLSRATFIITNGVSLKQIYKTTKNEKIKIRTLVGLC KLGSAGGTDYGLRQFAEGSTEKLAKQCRKWL CNMS IDTRTRRW AVEGLAYLTLDADVKKDFVQDVPALQAMFELAKTSDKTIYSV ATT LVNCTNSYDVKEVIPELVQLAKFSKQHVPEEHPDKKDFI DMRVKRLKAGVISALACMVKADSAILTDQTKELLARVFLALC DNPKDRGTIVAQGGGKALIPLALEGTD

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167	906	3	894	VDSVGGGSESRLDSPTSSPGAGTRQLVKASSTGTESDDFEE RDPDLGDGLNGLGSPFGKWTLSAAQTHQLRRLRGPACRECE EAFMVSGTECEECFLTCHKRCLETLLILCGHRRLPARTPLFGV DFLQLPRDFPEEVFPFVTKTAEIEHRALDVQGIYRVSGSRVR VERLCQAFENGRLVELSGNSPHDVSSVLKRFLQELTEPVIPIF HLYDAFTISLAKTLHADPGDDPGTSPSPSEVIRSLKTLVLQLPD SNYNTLRHLVAHLFRVAARFMENKMSANNLGIVFGPTL
168	907	1	394	GLHVISLHSA DGRHWEDPLSELDSERVSAFLVTETLVFYLFC LADET VVPPDVPSYLS SQGTLSDRQETTVRTEGGPQANGHIES NGKASVTVKQSSAVTVSLGAGGGLQVFTGQVPGIRWKGKLGAEH AS
169	908	179	551	KIKHRPEEEPRWAAAGASAGPGAEEVAPPRPGTVAPGANGMT DSATANGDDRDPEIELFVKAGIDGESIGNCPFSQRLFMILWLK GVVFNVTTVDLKRKPADLRNLAPGTHPPFLAFNWYVKT
170	909	1	335	LGFSDGQEARPEEIGWLNQYNETTGERGDFPGTYVEYIGRKKI SPPTPKPRPPRPLPVAPGSSKTEADVEQQVLYKYRKKPSSSHR PQTPHNGKSKNFLHKQGLKKKKASL
171	910	1	895	RTRGVMEALARRSPVPRWLLLLPLLLGLNAGAVIDWPTEEGKE VWDYVTVRKDAYMFWWLYYATNSCKNFSELPLVMWLQGGPGGS STGFGNFEEIGPLDSLKPRKTTWLQAASLLFVDNPVGTGFSY VNGSGAYAKDLAMVASDMMGLLKTFFSCHKEFQTVPFIYFSES YGGKMAAGIGLELYKAIQRGTIKCNFAGVALGDSWISPVDSVL SWGPLYLSMSLLEDKGLAEVSKVAEQVLNAVKNGLYREATELW GKAEMIEQVKRGNTQRRACLA FSGGYRAHWCCQTWSLH
172	911	553	194	PGWSRSPDLVIRLPRPPKVLGLQYYHFFFLRWSL/DSVAQAE VQWHDLRSLQAPPPGFTPFSCLSLPGSWDYRCPPPRPANFLYF **RRGFTVLARMVSI*PRDPPASASQSAGITVLSLFFFEME SCSVAQAGVQWRYLGSLQALPPGFTPFSCLSLPSWDYRRPPP RPAFFVFLVETGVSPC*PGWSRSPDLVIRLPQPPKVLGLQV
173	912	1761	1	PSMKTGELEKETAPLRKADSSISVLEIHSQKAQIEEPDPPM ETSLDSSEMAKDLSSKTALSSCTMKGEKSPKTKDKRPP ILECLEKLEKSKTFLDKDAQRLSPPEEVPKSTLESEKPGSP EAAETSPPSNIIDHCEKLASEKEVVECQSTSTVGQSVKKVDL ETLKEDSEFTKVEDNLDNAQTSGIEEPSETKGSMSKSKFYK LVPEEETASENTEITSERQKEGIKLTIRISSRKKKPDSPKV LEPENKQEKTEKEEEKTNVGRTLRRSPRISRPTAKVAEIRDQK ADKKRGEDEVEEESTALQKTDKKEILKKSEKDTNSKVSQVK PKGKVRWTGSRTRGRWKYSNDESESGSEKSSAASEEEEEKE SEEAILADDDEPCKKCGLPNHPILLLCDSCDSGYHTALPFAP PLMIHPQMGGW\F\CPTFCPTLNLLLLLEKLEDQF\QDL\DVAL KKERALPERRK\ERLVYVGI\SIENIIPPQ\EPDFSEDQEEKK KDSKSKANLL\ERRSTRKCI SYRDFEFDEAIEDDIK EADGGGVGRGKDISTITGHRGKDISTILDEER

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174	913	3	539	KRRGSFKMAELDQLPDESSAKALVSLKEGSLSNWTWNEKYSSL QKTPVWKGRNTSSAVEMPFNRNSKRSRLFSDEDDRQINTRSPKR NQRVAMVPQKFTATMSTPDKKASQKIGFRLRNLLKLPKAHKWC IYEWFYSNIDKPLFEGDNDFCVCLKESFPNLKTRKLTRVEWGK IRRLMG
175	914	166	635	MPEYLRKRFGGIRIPITILAVLYLFIYIFTKISVDMYAGAIFIQ QSLHLDLYLAIVGLLAITAVYTVAGGLAAVIYTDALQTLIMLI GALTLMGYSFAAVGGMELKEKYFLALASNRSENSSCGLPRED AFHIFRDPLTSDLWPWPGVLFMGMSIPSLX*
176	915	673	1025	XSASATSLTSLSHCVDVVKGLLDFKKRRGHSIGGAPEQRYQIIP VMCCSLLATGGADRLIHLWNVVGSRLEANQTLEGAGGSITSVD FDPSPGYQVLAATYNQVAQFWK*
177	916	3	139	QKRFPNSNCGRDGKFLWGGALHIIAKLLGKWRRLGMVFFSLLL SY
178	917	1	541	VHVCSSKMGALSTERLQYYTQELGVRERSGHSVSLIDLWGLLV EYLLYQEENPAKLSDQQEAVRQGNPYPIYTSVNVRTNLSGED FAEWCEFTPYEVGFPKYGAYVPTLFGSELFMGRLLQLQPEPR ICYLQGMWGSATFATSLDEIFLKTAGSGLSFLEWYRGSVNITDD CQKPQLHN
179	918	1	628	EFLGRPTRPAKDEGNDGKDEGKDEGKDEGKDEGKDEGKDERK DEGKDEGKDERKDEGKDEGKDEGKDEGKDEGKDEGKDEGKDEG NDEGKDEGKDEGKDEGKDEGKDEGKDERKDEGKDEGKDERKDE GKDEGKDEGKDEGKDEGKDEGKDEGKDEGKDEGKDEGKDEGKD EGKDEGKDEGKDEGNDGNDGNDGNDGKDEGKDERNDEGKDEGK DEGKDEGKDERNDEGKDERKDEGKDEGKDEGKDEGKDEGKDEG NDEGKDERKDEGKDEGKDEGKDK
180	919	27	471	PSLRPAWHIEGEDFSYGLQPYCGYSFQVVGEMIRNREVLPCPDD CPAWAYALMIEGWNEFPSRRARFKDIHSRLRAWGNLSNYSSE QTSGGRNTTQTSSLSTSPLCNVSNAPYVGPQKQVPPFPQTQVI PMKGQIRPMVPPPQLYVP
181	920	2	454	RNSGRHPRVRWILEERKRVMQEACAKYRASSRRRAVTPRHVSR IFVEDRHRVLYCEVPKAGCSNWKRVLMVLAGLASSTADIQHNT VHYGSALKRLDTFDRQGILHRLSTYTKMLFVREPFERLVSAFR DKFEHPNSYYHPVFCMAILAR
182	921	2	378	IMYSISPANSEEGQELYVCTVKDDVNLDTVLLLPLKETAIVSQ LDQLSPPEQLLVKCAAIIGHSFHIDLLQHLPLPGWDKNKLLQVL RALVDIHVLCWSDKSQELPAEPIIMPSSIDIIDGTKEKK
183	922	181	513	GPHVVLVLRRCFLLSYFKGVEKAKAMPSPRIKTHLSTQLLPP SFWENNCKVRYQQLPVTGKVSQPKRVLQTPQTQSIRDHCLST VSDAYQQRENIKFYIQQDIHLNSFK
184	923	32	239	FYYICRLSKEDKAFLWEKRYCFKHPNCLPKILASAPNWKWVN LAKTYSLLHQWPALYPLIALELLDSK

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185	924	3	361	KMMI*GLFEIQQCPIGKHCNFLQVLRN/PNRDL/WLVSSFGKS SKGRERMGGHDEYYRLRGR/HNPSPDHSYKRNSESERKRKKS *HMSKSQERHNSPSRGRNSDRSGGRCSRSNDGRSRYR
186	925	443	1412	PLSLFARVAGSRVEMPEPPGLGDEGRFLLHPGRREAVGSWVSA FAGDSTPCGPGDLSVPRREPFRLTAL*PHRSPVVRTSLIGLLL GFSVKEELRGVGVAAARTPLGIR
187	926	2	917	FDKRQHEARIQQMENEIHYLQENLKSMEEIQGLTDLQLQEADE EKERILAQLELEKKKKLEDAKSQEQVFGDLKELKKLKKAVAT SDKLATAELTIAKDQLKSLHGTVMKINQERAEEQLQEAERFSRK AAQAARDLTRAEAEIELLQNLRLQKGEQFRLEMEKTGVGTGAN SQVLEIEKLNEMERQRTETARLQNVLYLTGSDNKGGFENVLE EIAELRREGSYQNDYISSMADPFKRRGYWYFMPPPPSSKVS SSQATKDSGVGLKYSASTPVRKPRPGQDQGEKGSQPPASGYW VYSP
188	927	171	1082	SDASSFKTRVIVVPRPRVFPPLGSAITENSLESQIQGFVGF YSAFLVADKVIIVTSKHNDTQHIWESDSNEFSVIADPRGNTLG RGTTITLVLKEEASDYLELDTIKNLVKKYSQFINFPIYVWSSK TETVEEPMEEEEAAKEEKEESDDEAAVEEEEEKKPKTKKVEK TVWDWELMNDIKPIWQRPSKEVEEDEYKAFYKSFESKESDDPMA YIHFTAEGEVTFKSIILFVPTSAPRGLFDEYGSKKSDYIKLYVR RVFITDDFHDMPKYLNFVKGVVDSDDLPLNVSRETQLQHKLL KV
189	928	718	275	CGSWMRRALIPPCRGGPSASDRCCSCSPSGFSAGRGRCPVQGC LRPHRVQLLRWGPSPAGQRLSKGFQLLRWGPSPAPEPRK GPFPPDPWPVTAVTVMAGSVPSAQSVDALESPGPLALEGPS SPRNLLWREMSIFLPGIF
190	929	1	550	PGPTPPPRHGSPPHRLIRVETPGPPAPPADERISGPPASSDRL AILEDYADPFQVQETGEGSAGASGAPEKVPENDGYMEPYEAQK MMAEIRGSKETATQPLPLYDTPYEPEEDGATPEGEGAPWPRES RLPEDDERPPEEYDQPEWKKERISKAFVADIKVIKDLWPWPP VGQLDSSPSLP
191	930	1	562	QFFSLFLRYQIHTGLQHSIIRPTQPNCLPLDNATLPQKLKEVG YSTHMGVKGWHLGFYRKECMPTRRGFDTFGSLGSGDYVTHYK CDSPGMCYDLYENDNAWDYDNGIYSTQMYTQRVQQILASHN PTKPIFLYIAYQAVHSPQAPGRYFEHYRSIININRRRYAAML SCLDEAINNVTLALK
192	931	3	580	RVRKGRGGERLQSFRLVPQKPERPPLPPKPQFLNSGAYPQKPL RNQGVVRTLSSAQEDIIRWFKEEQPLRAGYQKTSDTIAPWF HGILTLKKANELLSGMPGSFLIRVSEIRIKGYALSYLESDGC KHFLIDASADAYSFLGVDQLQHATLADLVEYHKEEPITSLGKE LLLYPCGQDQLPDYLELFE

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193	932	3	1641	GSLEKALFQLLKVVWGQWAEQTRRLQRLDVSLSVARVRSAGPSC QNKGDLVMEALLEGIQNRGHGGGFLTSCAEELQELMKQIDIMV AHKKSEWEGRTHALETCLKIREQELKSLRSQLDVTHKEVGMLH QQVEEHEKIKQEMTMEYKQELKKLHEELCILKRSYEKLQKKQM REFRGNTKNHREDRSEIERLTAKIEEFQKSLDWEKQRLIYQQ QVSSLEAQRKALAEQSEIIQAQLVNRKQKLESVELSSQSEIQH LSSKLERANDTICANELEIERLTMRVNDLVGTSMTVLQEQQQK EEKLRESEKLLLEALQEEKRELKAALQSQENLIHEARIQKEKLO EKVKATNTQHAVEAISLESVSATCKQLSQELMEKYEELKRMEA HNNEYKAEIKKLKEQILQGEQSYSSALEGMKMEISHLTQELHQ RDITITASTKGSSSDMEKRLRAEMQKAEDKAVEHKEILDQLES LKLENRHLSEMVMKLELGLHECCLPVSPLGSIATRFLEEEELRS HHILERLDAHIEELKRESEKTVRQFTALK
194	933	159	1053	TGFLGWSQGPSLTPTSLALYPSQVEETGVVLSLEQTEQHSRR PIQRGAPSQKDTPNPGDSLDTGPRILAFPLHPPSLSEAALAAD PRRFCSPDLRRLGPILDGASVAATPSTPLATRHPPQSPLSADL PDELPVGTEVHRLFTSGKDEAVETDLDIAQDADALDLEMLA PYISMDDDFQLNASEQLPRAYHRPLGAVPRPRARSFHGLSPPA LKPSLLPRWGS DPRLS CSSSPSRGDPSASSPMAGARKRTLQAQSS KDEDEGVELLGVRPPKRSPPSEHENFLLFPLSLSLLTG
195	934	3	425	ELQDCFDVHDASWEEQIFWGWHDVHIFDTKTQTWFQPEIKGG VPPQPRAHTCAVLGNKGYIFGGRVLQTRMNDLHYLNLDWTW SGRITINGESPKHRSWHTLTPIADDKLFLCGGLNAYNMPPLSDG WIHNVTTWCWK
196	935	2	295	FFFFLRTSRHSVTPRWECSDDITAHWQPQWPWGSSDPLTFS/RPQ VVVPPRHTTLCPLANFFVFCIFCRNRISPCWPGWSRTPWAQLI RLPRPPKVLGLQV
197	936	2	737	PREGQVKQGLLGDCWFLCACAAQKSRHLLDQVIPPQPSWAD QEYRGSFCTRIWQFGRWVEVTTDDRPLCLAGRLCFSRCQREDV FWLPLLEKVYAKVHGSYEHFWAGQVADALVDLTGGLAERWNLK GVAGSGGQQDRPGRWEHRTCRQLLHLKDQCLISCCVLSPRAGE ARGQHGRAAASVPPTARPOAHCSFLCDWLHSPVRTKWEEVSLF SRVVSSVCDLPLLSSSRGTWPFSPLTSPFH
198	937	3	638	AECLEASIARYAHRVANSRYTFDGETVTLSPSQGVNQLHGGPE GFDKRRWQIVNQNDQVLFALSSDDGDQGFPGNLGATVQYRLT DDNRISITYRATVDKPCPVNMTNHVYFNLDGEQSDVRNHKLQI LADEYLPVDEGGIPHDGLKSVAGTSFDFRSAKIIASEFLADDD QRKVKGYDHAFLLOAKGDGKKVAAHVWSADEKLQLKVYT
199	938	69	425	PLSRFLSKESQEDWGMERQSRVMSEKDEYQFQHQGAVELLVFN FLLILTILTIWLFKNHREFRFLHETGGAMVYDKPPKFAMSREQM SQSCSHTAHNASLLTDAGPLSCGESRASCLFL

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200	939	3	435	DSKEPRLQQLGLLEEEQLRGLGFRQTRGYKSLAGCLGHGPLVL QLLSFTLLAGLLVQVSKVPSSISQEQSRQDAIYQNLTLQKAAV GELSEKSKLQEIYQELTQLKAAVAGELPEKSKLQEIYQELTWLK AAVAGELPEKSKMQE
201	940	657	469	MQSTAWGHRDRGESPLGWGQSESEASPSALTEAPKAAHTTRLG FLAANNPNHGSQPQDSFLL*
202	941	1	714	FETLSMRGIPHMLALGPQQLLAQDEEGDTLLHLFAAGRLRWAA YAAAEVLQVYRRDLREHKGKTPLLVAAAANQPLIVEDLLNLG AEPNAADHQGRSVLHVAATYGLPGVLLAVLNSGVQVDLEARDF EGLTPLHTAILALNVAMRPSDLCPRVLSTQARDRLDCVHMLLQ MGANHTIQVSGDVGGQTLGDCVWGHLDVRELQANADFASSLL RALEHVTSLLCALRVFCLFLCQL
203	942	3	479	DAWADAWGTKMADLDSPPKLSGVQQPSEGVGGRCSAISAE IRSLTELQELEAVYERLCGEEKVVERELDALLEQQNTIESKMN TLHRMGPNLQLIEGDAKQLAGMITFTCNLAENVSSKVRQLDLA KNRLYQAIQRADDILDLKFCMDGVQATALR
204	943	1	706	AVEFRVPRSGSAYLYSVTVGELWAF TTGWNLLISYVIGTASV ARAWSSAFDNLIGNHISKTLQGSIALHVPVHLAEYPDFFALGL VLLLTGLLALGASESALVTKVFTGVNLLVLGFMISGFVKGDV HNWKLTEEDYELAMAE LNDTYS LGPLGSGGFVFPFGEGILGA ATCFYAFVGFDCIATTGEEAQNPQRSIPMGIGISLSVCFLADF AVSSALTLMPPYYQLQPESP
205	944	1	852	GFHPNTTHYRARAARAGAGS FVGEVSAVDKDFGPNGEVRYSF EMVQPDFELHAISGEITNTHQFDRESLMRRRGTA VFSFTVIAT DQGIPQPLKDQATVHVYMKDINDNAPKFLKDFYQATISESAAN LTQVLRVSASDVDEGNGLIHYSIIKGNEERQFAIDSTSGQVT LIGKLDYEATPAYSLVIQAVDSGTIPLNSTCTLNIDILDENDN TPFF/LLNQHFFVDVLENMRIGELGASGTATDS\DSGDIADLY YKFTGTGKHPPGTFSISP KHLGVFFLAQK
206	945	3	363	GDCYDLYGGEKFATLAELVQYMEHHGQLKEKNGDVIELKNPL NCADPTSQRWFHGLSGKEAEKLLTEKGKHSFVLRESQSHPG DFVLSVCTGDDKGESNDGSKSVTHVMHCQELK
207	946	218	717	IDSGNQNGGNDKTKNAERNYLNVLPGEFYITRHSNLSEIHVA FHLCDVDDHVKSGNITARDPAIMGLRNILKVCCTHDITTSIPL LLVHDMSEEMTIPWCLRRRAELVFKCVKGFMEMASWDGGISRT VQFLVPQSI SEEMFYQLSNMLPQIFRVSSTLTLSKH
208	947	3	368	SILPALLVTILIFMDQQTAVTVNRKENKLKKAAGYHLDLFWV GILMALCSFMGLPWYVAATVISIAHIDSLKMETETSAPGEQFQ FLGVREQRVTGIIIVFILTGISVFLAPILKCIPLPV
209	948	2	575	GASRVBAGSANGMLIDGGSQIVKVQGHADGTTINKSGSQDVVQ GSLATNTTNGGRQYVEQSTVETTTIKNGGEQRVYESRALDTT IEGGTQSLNSKSTAKNTHIYSGGTQIVDNTSTSDVIEVYSGGV LDVRGGTATNVTQHDGAILKTNNTNGTTVSGTNSGAFSIHNV ADNVLLENGGHLIDINAYGS

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210	949	1	296	FFSSIQLTDDQGPVLMTTVAMPVFSKQNETRSKGILLGVVGT VPVKELLKTIPKYVMNDLIPEIKATEMPRALFSQSSGFKLYF GAMFLLTITAC
211	950	3	594	SCSGTGTNACYMEDMSNIDLVEGDEGRMCINTEWGAFGDDGAL EDIRTEFDRELDLGS LNPGKQLFEKMISGLYLGLVRLILLKM AKAGLLFGGEKSSALHTKGKIE TRHVAAMEKYKEGLANTREIL VDLGLPSEADCI AVQH VCTIVSFRSANLCAAALAILTRLRE NKKVERLRTTVGMDGTLYKIHPQY
212	951	2	2167	FVAIATNGVVPAGGSYYMISRS LGPEFGGAVGLCFYLGTTFAG AMYILGTIEILLAYLFPAMAIFKAEDASGEAAAMLNMRVYGT CVLTCMATVVFVGKYNKFALVFLGCVILSILAIYAGVIKSA FDPPNFPICLLGNRTLSRHGF DVC AKLAWEGNETVTTRLWGLF CSSRFLNATCDEYFTRNNVTEIQGIPGAASGLIKENLWSSYLT KGVIVERSGMTSVGLADGTPIDMDHPYVFSDMTSYFTLLVGIY FPSVTGIMAGSNRSGDLRDAQKSIPTGTILAIATTS AVYISSV VLFGACIEGVVLRDKFGEAVNGNLVVGTLAWPSPWVIVIGSFF STCGAGLQSLTGAPRL LQAISR DGIVPFLQVFGHGKANGEPTW ALLLTACICEIGILIASLDEVAPILSMFFLMCYMFVN LACAVQ TLLRTPNWRPRFRYYHWTL SFLGMSLCLALMFICSWYYALVAM LIAGLIYKYIEYRGAKKEWGDGIRGLSLSAARYALLRLEEGPP HTKNWRPQLLVLRVDQDQNVVHPQLLSLTSQKAGKGLTIVG SVLEGTFLFNHPQAQRAEESIRRLMEAEKVKGFCQVVISSNLR DGVSHLIQSGGLGGLQHNTVLVGWPRNWRQKEDHQWTRNFIEL VRETTAGHLALLVTKNVSMFPGNPERFSEGSIDRWGIGHDGGM LMLVPFLLRHHKVWRCKMRIFTVAQMVDHAM
213	952	1	128	FYLRLLSFFCFQEHEKRCWSVDFNLMDPKLLASGSDDAKGTV
214	953	3	244	RNSKAMHRSSCDGPLL SLPSVGRSATHALVQAQLICSGARRGM HAFIVPIRSLQDHTPLPGKPIMLPQGTLP GGEP RPWP
215	954	2	609	CGTLILQARAYVGPHVLAVVTRTGFTAKGGLVSSILHPRPIN FKFYKHS MKFVAALS VLALLGTIYSIFILYRNRVPLNEIVIRA LDLVTVVVPALPAAMTVCTLYAQSR LRRQGFICIHPLRINLG GKLQLVCFDKTGTLTEDGLDVMGVVPLKGQAF LPLVPEPRRLP VGPLLRALATCHALSRLQDTPVGDPMDLKM
216	955	292	855	QIEYFRSL LDEHHISYVIDEDVKSGR YMELEQRYMDLAENARF EREQLLGVOQHLSNTLKMAEQDNKEAQEMIGALKERSHMERI IESEQKGKAALATLEEYKATVASDQIEMNRLKAQLENEKQKV AELYSIHNSGDKSDIQDLLESVRLDKEKAETLASSLQEDLAHT RNDANRLQDAIAKGRG
217	956	2	400	ARYRFTLSARTQVSGEAVTEESPAPPNEATPTAAPPTLPPTT VGATGAVSSTDATAIAATTEATTVP I IPTVAPTTMATTTTAT TTTTTAAATTTTESPPTTTS GTKIHESAPDEQS IWNVTVL PNS KWA



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218	957	1	662	LKSTQDEINQARSKLSQLHESRQEAHRSLEQYDQVLDGAHGAS LTDLANLSEGVSLAERGSFGAMDDPFKNKALLFSNNTQELHPD PFQTEDPFKSDPFKGADPFKGDFFQNDPFQAEQQTSTDPFPGGD PFKESDPFRGSATDDFFKKQTKNDPFTSDPFTKNPSLPSKLD FESSDPFSSSSVSSKGSDFPGTLDPFPGSGSFNSAEGFADFSTI EGRRG
219	958	1	752	RTRGGSGNSSQPSLREGHDKPVFNAGKPHSSTSSPSVPKTS SRTQKSAVEHKAKKSLSHPSHSRPGPMVTPHNKAKSPGVRQPG SSSSSAPGQPSTGVARPTVSSGPVPRRQNGSSSGPERSISGS KKPTNDSNPSRRTVSGTCGPGQPASSSGGPGRPISGSVSSARP LGSSRGPGRPVSSPHELRRPVSGLGPPGRSVSGPGRSISGSIP AGRTVSNVSGRPVSSLGPGQTVSSSGPTIKPKCT
220	959	439	582	RGKGITPRYHLCISDPHNKICCRVNGEVQSSNTNQMVFKTE DLIAW
221	960	230	420	VVAVTRWLCENGVSYLKRCVCSACRHGTRCAGEVAAAANNSHC TVGIAFNAKIGGMGNQLTWM
222	961	311	490	GAPPPFVPTLKSDDTSNFDEPKKNSWSSSPCQLSPSGFSGE ELPFVGFYSYKALGIL
223	962	2	422	FVERLAHLHAACAPRRKVALLEVCRDVYAGLARGENQDPLGA DAFLPALTEELIWSPIGDTQLDVEFLMELLDPDELGEAGYY LTTWFALHHIAHYQPETDRAPRGLSSEARASLHQWHRRTLH RKDHPRAQQLD
224	963	385	844	FWMDPYNPLNFKAPFQTSGENEKGCRDSKTPSEIVAISECHT LLSCKVQLLGSQSECPDSVQRDVLSGGRHTRHVRKVKVTFLEE VTEYYISGDEDRKGPWEFARDGCRFQKRIQETEDAIGYCLTF EHRERMFNRLQGTCTFKGLNVLKQC
225	964	3	166	AASTAYSFFGTVENMAPKVVMRPGHTQSADWGSFGGLMGRFEF GIFLKGKEIVK
226	965	1	118	GFVFLPGPMSVGLDFSLPGMEHVYGIPEHADNLRKLVTE
227	966	1	390	GSECQGTDLDRNCTSDLCVHTASGPEDVALYVGLIAVAVCLV LLLLVLILVYCRKKEGLDSVDADSSILTSGFQPVSIKPSKADN PHLLTIQPDLSITTTTTYQGSILCPRQDGSPKFKLTNGHLLSPL G
228	967	1	777	LIYNEDMICWIESRESSNQLKCIQITKAGGLTDEWTINILQSF HNQQMAIDWLTRNLYFVDHVGDRIFVCNSNGSVCVTLIDLLEL HNPKAIAVDPIAGKLFFTDYGNVAKVERCDMDGMNRTRIISK TEQPAALALDLVNKLVDLYLDYVGVVDYQGNRHAIVQGR QVRHLYGITVFEDYLYATNSDSYNIVRISRFNGTDIHSLIKIE NAWGIRIYQKRTQPTVRSHACEVDPYGMPPGCCSHICLLSSSYT K
229	968	3	488	SSGNPQPGDSSGGGAGGGLPSPGEQLSRRLQRLYPVAVNQQT PLPRSWSPKDKYNYIGLSQGNLRVHYKGHGKHNKDAASVRATH PIPAACGIYYFEVKIVSKGRDGYMGIGLSAQGVNMNRLPGWDK HSYGYHGDDGHSFCSSGTGQPYGPTFTTGDVI

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230	969	1	228	FFFFKMGSRSVTQAGVQWCDVSSLQAPPPrFTLFCLSLPSSWD YRCVPPCPANFFVFLVETGFHRVSQYGLDLLTS
231	970	2	119	QLSLARGKVFLCALSFVYFAKALAEGLKSTITQIERRVDIPS SLVGVIDGSFEIGNLLVITFVSYFGAKLHRPKIIGAGCVIMGV GTLIIAMPQFFMEQYKYERYSPSSNSTLSISPCLESSQLPV SVMKSKSKISNECEVDTSSSMWIYVFLGNLLRGIGETPIQPL GIAYLDDFASDNAAFYIGCVQTVAIIGPIFGFLLGSLCAKLY VDIGFVNL/DHF*VSAQLGTRKGVLVCLVFCLLCQSIGRRLSE EHHHSDREKG
232	971	221	1068	QPAGRVEAFCKFHMWAEGMTSLMKAALDLTYPTSMFSGAGFN SSIFS VFKDQQIEDLWIPYFAITTDITASAMRVHTDGS LWRYV RASMSLSGYMPLCDPKDGHLLMDGGYINNLPADVARS MGAKV VIAIDVGSRDETDLTNYGDALSGWLLWKRWNP LTKVKVLNM AEIQTRLAYVCCVRQLEVVKSSDYCEYL RPPIDSYSTLDFGKF NEICEVGYQHGRTVFDIWRSGVLEKMLRDQQGPSKKPASAVL TCPNASFTDLAEIVSRIEPAKPAM
233	972	133	635	LWVIMFVSYLILTLHLHVQTAVLARPGGESIGCDDYLGSDKVVD KCGVCGGDNTGCQVVS GFVKHALTSLGYHRVVEIPEGATKINI TEMYKSNNYLALRSRSGRSIINGNWAIDRPGKYEGGTMFTYK RPNEISSSTAGESFLAEGPTNEILDVYVSLDVSGLFPGF
234	973	1	420	ISGGTRSAGPLRRNYNFIAAVVEKVAPSVVHVQLWGRNQQWIE VVLQNGARYEAVVKDIDLKLDLAVIKIESNAELPVLMLGRSSD LRAGEFVVALGSPFSLQNTATAGIVSTKQGGKELGMKDSMD YVQIDATINYG
235	974	2	860	PRVRELKEILDRKGHFSENETRWIIQSLASAIAYLHNNDIVHR DLKLENIMVKSSLIDDNNEINLNKVTDFGLAVKKQSRSEAML QATCGTPIYMAPEVISAHDYSQQCDIWSIGVVMYMLLRGEPPF LASSEKLFELIRKGE LHFENAVWNSISDCAKSVLKQLMKVDP AHRITAKELLDNQWLTGNKLSSVRPTNVLEMMKEWKNNPESVE ENTTEENKPKSTEEKLKSYPWGNVPETNYTSDEEEEEKQVGRI IAAFLPSVKYPHHTWNIFLQICLFVVS L
236	975	1	467	LSISVSDVSLSDSEGQYTCSLFTMPVKTSKAYLTVLGVPEKPQI SGFSSPVMEGDLMQLTCKTSGSKPAADIRWFKNDKEIKDVKYL KEEDANRKTFTVSSTLDFRVD RSDDGVAVICRVDHESLNATPQ VAMQVLEMHYTPSVKIIIPSTPFPQEG
237	976	3	417	YNQKVDLFSLGIIFFEMSYHPMVTASERIFVLNQLRDP TSPKF PEDFDDGEHAKQKSVISWLLNHDP AKRPTATELLKSELLPPQ MEESELHEVLHHTLTNVDGKAYRTIDGPRSFRQRISPAIA\YT YD\SDILKGN

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238	977	2	740	DQDYKYDSTSDSNFLNPPRGWDHTAPGHRTFETKDQPEYDST DGECDWSLWSVCSVTCGNGNQKRTRSCGYACTATESRTCDRPN CPGIEDTFRTAATEVSLLAGSEEFNATKLFVDTDS CERWMSCKSEFLKKYMHKVMNDLPSCPCSYPTVEVAYSTADIFDRIKRKDF RWKDASGPKEKLEIYKPTARYCIRSMLSLESTTLAAQHCCYGD NMQLITRGKGAGTPNLISTEFS AELHYKVDV
239	978	2	612	ESEENGESAMDSITVAKEGTNVPLVAAGPCDDEGIVTSTGAKEE DEEGEDVVTSTGRGNEIGHASTCTGLGEESEGLICESAEGDS QIGTVVEHVEAEAGAAIMNANENNVDMSGTEKSGKDTDICSS AKGIVESSVTS AVSGKDEVTPVPGGCEGPM TSAASDQSDS QLE KVEDTTISTGLVGGSYDVLVSGEVPECEVAH
240	979	79	361	VCIICLIFSYYSFDSALQSAKSSLGGNDELSATFLEMKGHFYM YAGSLLLKMGQHGNVQWRALSELALCYLIAFQVSLPLGAID ISRSLDVF
241	980	2	681	QHPSQEKQVLTTPSPRKQKLNRYRSHHDQMICKCLSLSTISYS ATIGGLTTIIGTSTSLIFLEHFNNQYPASEVNVFGTWFLFSFP ISLIMLVSVSWMHWFLLGCNFKETCSLSKKKKTKREQLSEKR IQEYEEKLGDISYEMVTGFFFI LMTVLWFTREPGFVPGWDSF FEKKGYRTDATVSVFLGFLFLIPAKKPCFGKKNDGENQEHSL GTEPIITWKDF
242	981	1	491	LEREGDKGTPLVLRGFSSVSGSWSRMPFFLLLTCLFITGTSVS PVALDPCSAYISLNEPWRNTDHLQDESQGPPLCDNHVNGEWYH FTGMAGDAMPTEFCIPENHCGTHAPVWLNGSHPLEGDGIVQRQA CASFNGNCCLWNTTVEVKACPGGYVYRLTKPSV
243	982	1	983	CGRTMSDIRHSLRRDALSAKEVLYHLDIYFSSQLQSAPLPI VDKGPVELLEEFVFPVKERSAQPKRLNSLQELQLEIMCNYF QEOTKDSVRQIIFSSLSFPQGNKADDSRMSLLGKLVSMAYAVC RIPVLECAASWLQRTPVVYCVRLAKALVDDYCLVPGSIQTLK QIFSASPRFCCQFITSVTALYDLSSDDLIPMDLLEMIVTWIF EDPRLILITFLNTPIAANLPIGFLELTPLVGLIRWCVKAPLAY KRKKKPPLSNGHVSNKVTKDPGVGMDRDSHLLYSKLHLSVLQV LMTLQLHLTEKNLYGPPGADPLRPHG
244	983	32	362	SACSTGPELPGRATRSITRANQKGC DGRLYDGCAMIAMNG SVFAQGSQFSLDDVEVL TATLDLEDVRSYRAEISSRNLA VSAP VDTCVGCSKTKWKVAPFVRAWWRP
245	984	158	398	APLSRLCFPQVLVNEG GGFDRASGSFVAPVRGVYSFRFHVVKV YNRQTVQVTSALAPIPGSGGWGGGRRGAQLTSGWTLH
246	985	2	707	PHIIGAEDDDFGTEHEQINGQCS CFQSI ELLKSRPAHLAVFLR HVVSQFDPATLLCYLYSDLYKHTNSKETRRIFLEFHQFFLDRS AHLKVSVPDEMSADLEKRRPELIPEDLHRHYIQTMQERVHPEV QRHLEDFRQKRSMGLTLAESELTKLDAERDKDRLTLEKERTCA EQIVAKIEEVLMTAQAVEEDKSSTMQYVILMYMKHLGVKVKEP RNLEHKRGRIGFLPKIKQSM

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247	986	18	441	SPGTGRGPGPPTS FVCLPTPQCPFIDDFILALHRKIKNEPVVFP EGPEISEELKDLILKMLDKNPETRIGVPDIKLHPWVTKNGEPP LPSEEEHC SVVEVTEEEVKNSVRLIPSWTTVILVKSMLRKRSF GNPFEPQARMA
248	987	3	732	HASGIKIDKTS DGP KLF L TEEDQKKLHDFEEQC VEM YFNEKDD KFHSGSEERIRVT FERVEQMC IQI KEVGDRVNYIKRSLQSLDS QIGHLQDLSALTVDTLKTLTAQKASEASKVHNEITRELSISKH LAQNLIDDGPVRPSVWKKHGVVNTLSSSLPQGDLESNNPFHCN ILMKDDKDPQCNI FGQDLPAVPQRKEFNFP EAGSSSGALFPSA VSPPELRQRLHGVVELLKIFNKKQKKRA
249	988	3	468	CCRWIDCFALYDQQEELVRHIEKVHIDQRKGEDFTCFWAGCPR RYKPFNARYKLLIHM RVHSGEKPNKCTFEGCEKAFSRLENLKI HLRSHTGEKPYLCQHFGCQKAFSNSSDRAKHQRTHLDTKPYAC QIPGCTKRYTDPSSSLRKHVKAHSSK
250	989	356	553	LPLLWTLSDFGGTMDSGMEIPVTLLTIKAPNQKYS DQTISCFL NWTVGK LKTHLSNVYPSKPVSV
251	990	1	895	AGTRMCVVA AEELVCGA\ RGLWMRRTRRRPRFVLMNKMDDLNL HYRFLNWRRRIREIREVRAFRYQERFKHILVDGDTLSYHGNSG EVGCYVASRPLTKDSNYFEVSIVDSGVRGTIAVGLVPQYYS LD HQPGLWLPDSVAYHADDGKLYNGRAKGRQFGSKCNSGDRIGCGI EPVSFDVQTAQIFFTKNGKRVGSTIMPMSPDGLFPAVGMHSLG EEVRLHLNAELGREDDSVMMVDSYEDWGR LHDVRCGTLLEY LGKGKSI DVGLAQAARHPLSTRSHYFEVEIVDPGEKCYIA
252	991	51	674	QQAEEHLAAYS VSDSDSGKDPSMECCRRATPGTLLLFLAFLLL SSRTARSEEDRDGLWDAGWPSECSRTCGGGASYSLRCLSSK SCEGRNIRYRTCSNVDCPPEAGDFRAQQCSAHNDVKHHGQFYE WLPVSNPDNPNCSLKCQAKGTTLVVELAPKVLDTGTRCYTESLD MCTISGLCQVSADLFSFNLSRGFOCLCVNGLHSLTL
253	992	2	554	RLLRQELVVLCHLHHPSLISLLAAGIRPRMLVMELASKGSLDR LLQQDKASLTRTLQHRIALHVADGLRYLHSAMI IYRDLKPHNV LLFTLYPNAAI IAKIADYGIAQYCCRMGIKTSEGTGFRAPFV ARGNVIYNQQADVVSFGLLLYDILTTGGRIVEGLKFPNEFDEL ETQGKL PDPVKE
254	993	3	437	KASNSTHEFRIGLPEGWESEKKAVIPLGIGPPLTLICLGVLG ILIIYGRKGFQTAHFYLDSPSPKVISTPPPIFPISKEVGPPI IKHFPKHVANLHASRGFTEKFETLKKFYQEGQ SCTVDLGITAN SSNHDPNRRHRNSLI
255	994	3	445	SFPDR TASLVLLSVFVGQAGMQQRGLAIVALAVCAALHASPAT LPIASSCCTEVSHHISRLLERVMCRIQRADGDCDLAAVILH VKRRRI CVSPHNHTVKQWMKVQA AKKNGKGNVCHRKHHGKRN SNRAHQGKHETYGHKTPY

SEQ ID NO: of Nucleic Acids	SEQ ID NO: of Amino Acids	Predicted beginning nucleotide location corresponding to first amino acid residue of amino acid sequence	Predicted end nucleotide location corresponding to first amino acid residue of amino acid sequence	Amino acid segment containing signal peptide (A=Alanine; C=Cysteine, D=Aspartic Acid, E= Glutamic Acid, F=Phenylalanine, G=Glycine, H=Histidine, I=Isoleucine, K=Lysine, L=Leucine, M=Methionine, N=Asparagine, P=Proline, Q=Glutamine, R=Arginine, S=Serine, T=Threonine, V=Valine, W=Tryptophan, Y=Tyrosine, X=Unknown, *=Stop Codon, /=possible nucleotide deletion, \=possible nucleotide insertion)
256	995	2	737	FEQPGNPGDPRVRTPPPWGPHFFALIPSSPKEVPATPSSRRDP IAPTATLLSKKTPATLAPKEALIPPAMTVSPKKTPTAIPTPKE APATPSSKEASSPPAVTPSTYKGAPSPKELLIPPAVTSPPSPKE APTPPAVTPPSPEKGPATPAPKGTPTSPPVTPSSSKDSPTSPA SVTCKMGATVPQASKGLPAKKGPTALKEVLVAPAPESTPIITA PTRKGPQTKKSSATSPPICPDPSAKNGSKG
257	996	79	3	FFLKIQGLGWARWLTVPVLPVLWEAE
258	997	307	475	AGFGYGLPISRLYAKYFQGDNLNLYSLSGYGTDAIITYLKVSLEF NSKILFLKPLLLL
259	998	26	622	WMRAPMLQKQAPRMDTPPPEERLEKQNEKLNNQEEETEFKEL DGLREALANLRGLSEERSEKAMLRSRIEEQSQLICILKRRSD EALERCQILELLNAELEKMMQAEKLLKAQGEYSRKLEERFMT LAANHEMLMLRFKDEYKSENIKLREENEKLRLNENSLFSQALKD EEAKVLQLTVRCEALTGELETLKERC
260	999	2	241	DPGASHASVQVQVLKEQLFAGRMPSPPFRSCALMGMCGRSADN LSCPSPNLNMEPVSVFFPLKSLGKGMIOHFRHIVSLV
261	1000	1	620	VTTTTHSVGRGHEQLLNEELRNIELECQNIQAHRLQKVTDQ YGDIIWTLHDGGFRNYNTSIDMQRGKLDIMEHPEKSDKSSSA YNTAESCRSTPLTVDRSPDSSLPRVINLTNKNLRSMTAATQS SSGQSSKESTSTKAKTTEQGCSAESKEKVLGSKLPDQEKAVS EHIPYLSPHYSSSYRYANI PAHARHYQSYMQLIQ
262	1001	3	420	VWGCLATVSTHKKIQGLPFGNCLPVSDGPFNNSTGIPFFYMTA KDPVVADLMKNPMASLMLPESEGEFCRKNIVDPEDPRCQVLT TGQMIAVSPPEVEFAKQAMFSRHPGMRKWPRQYEWFFMKMRIE HIWLQKWYG
263	1002	43	441	QAANMAVARVDAALPPGEGSVVNWSGQLQKLGPNLPCEADIH TLILDKNQIIKLENLEKCKRLIQLSVANNRLVRMMGVAKLTLL RVILNLPHNSIGCVEGLKELVHLEWLNLAGNNLIAMEQINSCTA LQHL
264	1003	3	834	FRAAVGAVPEGAWKDTAQLHKSEEAQRVLRYYLFQGGQRYIWE TQQAFYQVSLLDHGRSCDDVHRSRHGLSLQDQMERKAIYGNV ISIPVKSYPQLLVDEAFSIALWLADHYWYALCIFLISSISIC LSLYKTRKQSQTLRDMVKLSMRVCVCRPGGEEEWVDSSELVPG DCLVLSQEGGLMPCDAALVAGECMVNDSSLTGESIPVLKTALP EGLGPYCAETHRRHTLFCGTLLIHARAYVGPVHLAVVTRTGMS REAGLERDPGSAPLKRWS
265	1004	2	670	FVGGGLHLHLCLLLCFMLPEDAAMAVLTASNHVSNVTVNYNIT VERMNRMQGLRVSTVPAVLSPNATLALTAGVLVDSAVEVAFLW TFGDGEQALHQFPYPYNESFPVPDPSVAQVLVEHNVHTHTYAAP GEYVLTVLASNAFENRTQQVLIRSGRVPIVSLECVSCKAQAVY EVSRSYVYLEGRCLNCSSGSKRGRWAARTFSNKTLLVLETTT STGSASM

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266	1005	2	1093	PEFLGRLFRGKAATLHVHSDQKPLHDGALGSQQNLVRMKEALR ASTMDVTVVLP SGLEKRSVLNGSHAMMDLLVELCLQNHLNPSH HALEIRSETQQPLSFKPNTLIGTLNVHTVFLKEKVPEEKVKP GPPKVPEKSVRLVVNYLRTQKAVVRVSPEVPLQNILPVICAKC EVSPEHVLLRDNIAGEELELSKSLNELGIKELYAWDNRRETF RKSSLGNDETDKEKKKFLGFFKVNKRNSKGLTTPNSPSMHS RSLTLGPSLSLGSISGVSVKSEMKKRRAPPPPGSGPPVQDKAS EKVSLGSQIDLQKKRRAPAPPPPQPPPSPLIPNRTEDKEEN RKSTMVYCCASFPTQAKRF
267	1006	686	400	VQWHNLHSLQPLPAGFK*FLCFSLPSSWDYRCAPPLF/APFFF YFLFLVELGFHHIG*AGLELTSTDLPASAS/ESAGITGMSHRA RPMDFLLKIL
268	1007	1	453	GRRFRPPSDEEREPWEPWTQLRLSGHLKPLHYNMLTAFMENF TFSGEVNVETACRNATRYVVLHASRVAVEKVQLAEDRAFGAVP VAGFFLYPQTQVLVVVLNRTLDAQRNYNLKIYNALIENELLG FFRSSYVLHGERRFLGVTQFSP
269	1008	333	526	KELDPFYNS*RKIKYLRIYLTKEVKDLYKENYKTLLEITDDT N/KKHIPSSWTGRINTVKMTIL
270	1009	699	882	VPHPLQAIHEQMNCKEYQEDLALRAQNDAARRPSEMFKVRLA QGRGLASLSSGIQSGVG
271	1010	16	148	RWNSLTCVLTFLGHRLLKRFLVPKLRRFLKPQGHPRLLLWFK R
272	1011	1	659	YGEFVTYQGVAVTRSRKEGIAHNYKNETEWANIDTVMWAFTE EDLDLVTLYFGEPDSTGHRYPESPERRMVRQVDRVTGYLRE SIARNHLTDRLNLIITSDHGMTTVDKRAGDLVEFHKFPNFTFR DIEFELLDYGPNGMLLPKEGRLEKVYDALKDAHPKLHVYKKEA FPEAFHYANNPRVTPELLMYSDLGYVIHGVSRLLEAPPPGAPSP GSGS
273	1012	146	413	RIPLRLRSSTYRSKGFDTVVKHSHGSWTGFGGEDLATIPKGL NTYFLVNIATIFESKNFFLPGIKWNGILGLSYATLAKPSSSLE TFF
274	1013	3	251	IKSYSGPNRSCQIWQRLRWGSRELLLGWKLSHSFSTCFPQFP DIVEFCEAMANAGKTVIVAALDGTFRKVRRLIQVSWD
275	1014	326	651	YCFCFDLLH*CIHRDVKPENILITKHSVIKLCDFGFARLLTGP SDYYTDYVATRWYRSPPELPGDTQY\GPPV\DVW\AIGCVSAE \LLSGKCLWWPGKS/DMLDQLYLIRK
276	1015	224	435	RGWALDWIGADLSLHLQEEVETEVAWEECGHVLLSLCYSSQQG GLLVGVLRCAHLAPMDANGYSDPFVRL
277	1016	2	429	GGILAMEYAPGGTLAEFIQKRCNSLLEEETILHFFVQILLALH HVHTHLILHRDLKTQNILDKHRMVVKIGDFGISKILSSKSKA YTVVGTPCYISPCEGKPYNQKSDI WALGCVLYELASLKRAF EAANLPALVLKIM

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278	1017	1	262	VQCGGIHQVSGAVVVSGLLQGMMGLLGSPPGHVFPFCGFLVLAP SLVVAGLSAHREVAQFCFTHWGLALLYVSPERRGMVPSGGVWG D
279	1018	1	480	PRMTGSTHASAPSYGGSCRNNLFYREETYTPKAETDEMNEVET APIPEENHVWLQPRVMRPTKPKKTSAVNYMTQVVRCDTKMKDR CIGSTCNRYQCPAGCLNHKAKIFGSLFYESFASICRAAIHYGI LDDKGGVLVDITRNGKVPFFVKSERHGVQSLR
280	1019	271	792	VPQNIICAFFCVPCRFSTIPFWGLTLHLQHLGNNVFLQLTLF GAVTLLANCVAPWALNHMSRRLSQMLLMFLATCLLAIIFVPQ EMQTLRVVLATLGVGAASLGITCSTAQENELIPSIIRGRATGI TGNFANIGGALASLVMILSIYSRPLPWIIYGVFAILSGLVLVLL LP
281	1020	2	679	VLVSRDHMSAQQFFQLVGGSSASECDTIPGRQCMASCFLLKQ FDDVLIYLNSEFKSHFYNDIIFNFNYAQAKAATGNTSEGEAFL LIQSEKMKNDYIYLSWLARGYIMNKKPRLAWELYLKMETSSES FSLQLIANDCYKMGQFYYSAKAFDVLRLDPNPEYWEGKRG CVGIFQMI IAGREPKETLREVLHLLRSTGNTQVEYIMIRIMKKW AKENRVSILK
282	1021	3	359	LKVSDELVQQYQIKNQCLSAIASDAEQEPKIDPYAFVEGDEEF LFPDKKDRQNSEREAGKKHKVREITVHQRTVDVFALHIVTLL LPQLSHFFCLRIERVIIYLEKPIFARLRWLMP
283	1022	3	538	GVPRLPSSLEVLILLSYNRIVKLAPEDLANLTALRVLDVGGNC RRCDHAPNPMCPCPRHFPQLHPDTFSLHSLRLEGLVLKDSLSW LNASWFRGLGNLRVLDLSENFYLYKCIKTAKAFQGLTQLRKLNL SFNYQKRVSFAHLVSGPPFLRGLSLGRPLKGAGTWHGNLSFPLH FEWGKT
284	1023	3	442	ILFAALIWSSF DENIEASAGGGGGSSIDAVMVDGAVVEQYKR MQSQESSAKRSDEQRKMKEQQAEEELREKQAEQERLQLEKE RLAAEQKKQAEAAKQAELEKQKQAEAAAKAAADAKAKAEAD AKAAEEAAKAAADAKK
285	1024	1	119	AMEIVHEPRDLERYMREAVKVSNDSPVLLDRFLNDAIEC
286	1025	67	227	MLSPGYDYGVCVEFSLLEDAIGCMEANQVALYFGQMMLEGYI FLYMGREGFK
287	1026	2	1101	PRVRSSGGQEDPASQQWARPRFTQPSKMRRRVIA RPVGSSVRL KCVASGHPRPDITWMKDDQALTRPEAAEPRKKKWTLSLKNLRP EDSGKYTCRVSNRAGAINATYKVDVIQRTSRKPVLTGTHPVNT TVDFGGTTSFQCKVRSVDKPVIQWLKRVEYGAEGRHNTIDVG GQKFVVLPTGDVWSRPDGSYLKLLITRARQDDAGMYICLGAN TMGYSFRSAFLTIVLPDPKPPGPPVASSSSATSLPWPVVGIPA GAVFILGTLTLLWLCQAQKKPCTPAPAPPLPGHRPPGTARDRS DKDLPSLAALSAGPGVGLCEEHGSAPAPQHLLGPGPVAGPKLY PKLYT\DI PHHTHTHTPHPPAN
288	1027	3	96	NFHFTGKCLFMSGLSEVQLTHMDHTLPGY

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289	1028	95	407	SPRKRKTRHSTNPPLCHVGVWMDSRDHGPGTSSVSTSNASPS EGAPLAGSYGCTPHSFQHPKQHPHSELLKENGFTQQVYHKYRRR CLSERKRLGIGQSQEMNT
290	1029	1	359	PGSGGSAGGRDGSAYQGALLPREQFAAPLGRPVGTSSYSATYPA YVSPDVAQSWTAGPFDGSLHGLPGRRPTFVSDFLFEEFPGEGR ECVNCGALSTPLWRRDGTGHYLCNACGLYHKMN
291	1030	2	513	PDHRHGALWWWYSCGVLPVTVSRNEGDERNQVLTLYLWIRQEW TDAYLRWDPNAYGGLDAIRIPSSSLVWRPDIVLYNKYCLS/AAP PLSYPSLDLPLAVGV**SPLPTT*PGCHAALEAFPQDPSKLPS TQPLHGTPTLGYPRPAQAERLLGTTCVVQGRCLNHKGLSRAHF
292	1031	1	595	YALTGALVIVTGMVMGNADYFNLVSSMSNTFTFLNAGILIS IFLNAWLMEIVPLKTQLRFGFLLMVLAVALGMLFMSHSLAFLSAA MFILGVVSGITMSIGTFLVTQMYEGRQGRSRLFTDSFFSMAG MIFPMIAAFLLARSIEWYVWYACIGLVYVAIFILTFGCEFPAL CSHATKLGTAASSYPSLDVVQLRTLNA
293	1032	71	479	MAKVGKTEHYDRYPHMFSGGQRQRIATARGMLMDPDVVIAD PVSALDVSVRAQVLNLMMDLQQELGLSYVFISHDLSVVEHIAD EVMVMYLGRCEVKGTKDQIFNNPRHPYTQALLSATPRLNPPDR RERIKLSX*
294	1033	2	427	SATLERVLNHPDETQARRLMTLEDIVSGYSNVLISLADSQGKT VYHSPGAPDIREFTRDAIPDKDAQGGEVYLLSGPTMMMPGHGH GHMEHSNWRMINLPGPLVDGKPIYTLTYIALSIDFHLHYINDL MNKLIMTASVII
295	1034	3	342	VLAYPGIKVSTAERAILPAQYRRQDCIAHGRHLAGFIHACYS RQPELAAKLMKDVIAEPYRERLLPGFRQARQAVAEIGAVASGI SGSGPTLFALCDKPEAQRVADWLK
296	1035	2	279	GQQQRVALARALILKPKVLLFDEPLSNLDANLRRSMRDKIREL QKQFDITSLYVTHDQSEAFVSDTVLVMNKGHIMQIGSPQDLR VRRLNW
297	1036	3	157	AVHYLERVRIAHAHKFPGQISGGQQQRVAIARSLCMKPKIML FDEPTSL
298	1037	1	217	APYDAENYFDYDNLNNGPSLQHWFGVDLSGRDIFSRVLVGAQI SLAAGVFAVFIGAAIGTLLGLLAGYYEGW
299	1038	3	570	VFCLIDLDPIDELVDFFIVYASALNGIAGLDHEDMAEDMTPL YQAIVDHVPAPDVLDDGPFQMQLSGLDYSYVGVIGIGRIKRG KVKPNQQVTIIDSEGKTRNAKVGKVLGHLGLERIEITDLAAGD IVAITGLGELNISDTVCDTQNVEALPALSVDPTVSMFFCVNT SFFCGKEGKFVTSRQI
300	1039	1	366	QGTRESQSSSKDKTRLAFAGLKFGDYGSIDYGRNYGVAYDIG AWTDVLPEFGGDTWTQTDVFMTRATGVATYRNNDFGLVDGL NFAAQYQGNDRSDFDNYTEGNHGHGFGFSATYIEYEG
301	1040	3	201	DTYSVSIPLGATINMAGAAITITVLTAAVNTLGIPVDLPTAL LLSVVASLCAAGSGVAGGSL



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302	1041	1	140	ANAQQGLPSGITLKLNNLVDKGLVDRLYAASSSGVPVNLVVRG TCS
303	1042	2	442	ARMTLIPGTHLLENIHNIWVNGVGTNSAPFWRMLLNSFVMAFS ITLGKITVSMLSAFAIVWFRFPLRNLFWMIFITLMLPVEVRI FPTVEVIANLQMLDSYAGLTPLMASATATFLFRKLNMSGPDK VVPAARISGYGPRVRKQ
304	1043	2	403	CAKCLRDADECPSGAFERIGRDISLDALEREVMKDDIFFRTSG GGVTLSGGEVLMQAEFATRFQLRLRWGVSCAIETAGDAPASK LLPLAKLCDEVFLDKIMDATQARDVVKMNLPRVLENLRLLSV EGVN
305	1044	1	346	YLLLFVCFVLMSLLVGLVYKFTAERAGKQSLDDLMSLYLMR SELREIPPHDWGKTLKEMDLNLSFDLRVEPLSKYHLDDISMHR LRGGEIVALDDQYTFQLQIRSHYVLAVG
306	1045	1	207	VELFLSDEGDDVIEVADQCGVPESLRDKIFEQGVSTRADEP GEHGIGLYLIASVYTRCGGVITLEDN
307	1046	3	213	DAIIAPDANALPAAQAENLNKNDKVAIVGFSTPNVMRPFYVER GTVKEFGLWDVVQQGKISVYVADALQ
308	1047	1	129	YIVVTGKTHCGTPLTTVTGDATQSGYLTLNLPEMWEVSGYNRV
309	1048	271	46	XEGVEPDINASKTRQQLNDVAGMKIIEARLSALTNNQTKSLK LNPVALPKVASQLLDELGYSLARRADLQSAHX*
310	1049	16	253	ENIAEEYATKRYRSNVINWGMLPLQMAEVPTFEVGDYIYIPGI KAALDNPGETTFKGYVIHEDAPVTEITLYMESQEART
311	1050	2	299	LQTEIGSMVYAVKPGDGSAREQAASCQRVTGGLANTAEYATK RYRSNVINWGMLPLQMAEVPTFEVGDYIYILGFKAAKYSPGTA FTVYAISGYGPRI
312	1051	1	344	TLEDLLMALDGEQHLQQQVSEKVLADNVLIAPGSVKPDATFWS ALIQDRYNVMTCTIEKDACVLVEQDLNSDGAERILFAFNDDRIV YVGFDSDRKEWDALDMSLLPNEITKEK
313	1052	2	630	ESNSRCRKMPGERCRGGPARLSLLLDLPTPLPHPRQVIDFGS ASIFSEVRYVKEPYIQSRFYRAPEILLGLPFCEKVDVWSLGCV MDELHLGWPLYPGNNEYDQVRYICETQGLPKPHLLHAACKAHH FFKRNPHPDAAANPWQLKSSADYLAETKVRPLERRKYMLKSLDQ IETVNGGSVASRLTFPDREALAEHADLKSMVEL/MKRL
314	1053	1	302	RLVKKRVECRQCGKAGRNQSTLKTMRSHTEKPYECDHCGKA FSIGSNLNVHRRITHTGEKPYECLVCGEAFSDHSSLRSHVKTHR GEKLFVSSVWKRLQ
315	1054	1318	730	CGPGFSLSFFFFLRWSF\ALVAQAGVQWHDLSLQPPAPGFKRF SSLSLLSRWDYRHAHARLIFVFLVEMGFLHVGQAGLELPTSGD PPTSASQSARITGVTTPLGTFFFFFLRWSFALVAQAGGQCLDLG SLQLPPPGFKRLVCHFQTPQKHRCSCQAPGDCLQESFVMTGCV LRTVSESQVRANAGAGAETVQGL

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316	1055	2486	1429	MGNAAAARKGSEQESVKEFLAKAKEDFLKKWESPAQNTAHLDO FERIKTLTGSPGRVMLVKHKETGNHYAMKILD*QKVGKLGKQI EHTLNEKRILQAVNFPFLVKLEFSFKDNSNLYMVMEYVPGGEM FSLHRRIGRFSEPHARFYAAQIVLTFEYLHSLDLIYRDLKPEN LLIDQQGYIQVTDGFAKRVKGRWTWLCGTPEYLAPEIILSKG YNKAVDWWALGVLIIYEMAAGYPPFFADQPIQIYEKIVSGKVR PSHFSSDLKDLLRNLLQVDLTKRFGNLKNGVNDIKNHKWFATT DWIAIYQRKVEAPFIPKFKGPGDTS\NFDDYEEEEIRV\SINE KFG\KEFSEF
317	1056	867	461	SSSRSSHGDSPPHSQTPCDTNRGLDTKH*/DSQSIEEKDSSQS E*NRIERRKEVERILQTNSDYM*HWSN*PENILPKKFFSKHQK CTATLSMRNTSIM/KKEGLF*AQFPSSLLSHLFAVGLGIYTGT HLTTSTSTF
318	1057	544	784	TFHSSLEKNILQPCR*RR*\ICLPLLL*PSVPLLAPQYFSDLR NSIVNSQPPEKQQAHLFCFENLMEGIERNLLTKNRDR
319	1058	1606	228	GTSGVQQEISRLTNENLDLKELEKLEKNERKLKKQLKIYMKK AQDLEAAQALAQSERKRHELNQVTVQRKEKDFQGMLEYHKED EALLIRNLVTDLPQMLSGTVPCLPAYILYMCIRHA\DYTNDD LKVHSLLTSTINGIKKVLKKHNDDEFMTSFWLSNTC\RLLHCL KOYSGDEGFMQTAKQN\EHCLKNFDLTYRQV\L\SDLSIQ IYQQLIKIAEGLVQPMIVSAMLN*SIQGLSGVKPTGSQKHSS SMADEDNSYRLEAI IROMNAFHTVMCDQGLDPEIILQVFKQLF YMINAVTLNDLLLRKDVCSWSTGMQLRYNISQLEEWLRGRNLH QSGAVQTMEPLIQAAQLLQLKKKTQEDAEIACSLCTSLSTQQI VKILNLYTPLNEFEERVTVAFIRTIQAQLQERNDFQQLLLDAK HMFVPLFPFNPSSLTMDSIHIPACLNLEFLNEV
320	1059	3	250	HEENTILKAAEVQVPPK*VVTPEAKAFI*RCLAYQKEDCIDAQ QLACDP\YLLHYIQKLVFVSSPAGAAIASTFGVSNSSCSN
321	1060	1332	500	GTTDEIMTRWARVSTYNNRPLPATSWEDMKKGSFEGTSQNL KRKQLEANRLSLKNDAPQAKHKNNKKKEYLNEDVNGFMEYLR QNSQMVHNGQIIATDSEEVREEIAVALKKDSRREGRRRLKRAA KKNAMVCFHCRKPGHGIADCPAALENQDMGTGICYRCGSTEHE ITKCKAKVDPALGEFFPAKCFVCGEMGHLRSRCPDNPGLYAD GGGCKLCGSVEHLKKDCPESQNSERMVTVGRWAKGMSADYBEI LDVPPKPKPKTKIPKVVNF
322	1061	384	102	DHVRKSLLKNRAENIVNIFKCNVVSLLPNLPAFGQAQWLTPVIP ALWEAEVGGG*GQEIETILANAVK/SPFLLKIQKKISRWWR AP/VSPRYSGG

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323	1062	1	777	SDAWADAWARSLSVSPSSYPELHTEVPLSVLILGLLVVFILSV CFGAGLFVFLKRRKGVPSVPRNTNNLDVSSFQQLQYGSYNTET HDKTDGHVYNYIPPPVVQMCQNPIYMAGREGRPSSLLPKPGKE FQLLGNLEEKKEEPPATPAYTISATELLEKQATPREPELQYQNI AE/PSQGT/TAQA*STITFVPYLKGQFAPSYESRRQNQDRIN KTVLYGTPRKCFVQGSKPNHPLLQAKPQSEPDYLEVLEKQTAI SQL
324	1063	1	1496	ALCHIAVGQQMNLHWHKIGLVVILASTVVAMSAVAQLWEDEW EVLLISLQGTAPFLHVGAVAAVTMLSWIVAGQFARAERTSSQV TILCTFFTFFVFLYLAFLTISSPCIMEKKDLGPKPALIGHRGA PMLAPEHTLMSFRKALEQKLYGLQADITISLDGVPFLMHDTTL RRTTNVEEEFPELARRPASMLNWTTLQRLNAGQWFLKTDPFWT ASSLSPSDHREAQNSICSLAELLELAAGNATLLNLRDPPRE HPYRSSFINVTLLEAVLHSGFPQHQMVLPSRQRPVLRKVAPGF QQTSGSKEAVASLRGHIQRLNLRYTQVSRQELRDYASWNLSV NLYTVNAPWLFSLWCAGVPSVTSDNSHTLSQVPSPLWIMPPD EYCLMWVTADLVSFLLVIGIFVLQKWRLGGIRSYNPEQIMLSA AVRRTSRDVSIMKEKLIFSEISDGEVSDVLSVCSDNSYDTYA NSTATPVGPRGGGSHTKTLIERSGR
325	1064	1899	776	NSADYGDGPDSSDADPDSGTEEGVLDPSDFSTEVKPRILLMG LRRSGKSSIQKVVFHKMSPNETLFLESTNKICREDVSNSSFVN FQIWDFFPGQIDFFDPTFDYEMI FRGTGALIFVIDSQDDYMEAL ARLHLTVTRAYKVNTDINFEVFIHKVDGLSDDHKIETQORDIHQ RANDDLADAGLEKIHLSFYLTISIYDHSIFEAFSKVVQKLIPQL PTLENLLNIFISNSGIEKAFLEDVVSKEYIATDSTPVDQMOTYE LCCDMIDVVIDISCIYGLKEDGAGTPYDKESTAI IKLNNTTVL YLKEVTKFLALVCFVREESFERKGLIDYNFHCFRKATHEVFEV RMKVVKSRKVQNRLLQKKKRATPNGTTPRVLL
326	1065	1181	346	RTRGRDPGAGFRRTANKRCCRRRFLIGCGWLPLRSDWPLVSKM LSKGLKRRKEEEEEKEPLAVDSWWLDPGHAAVAQAPPVASSS LFDLSVLKLHLSLQQSEPDRLHLVLVNTLRRIQASMAPAAAL PPVPSPPAAPSVADNLLASSDAALSASMASLLEDLSHIEGLSQ APQPLADEGPPGRSIGGAAPSLGALDLLGPATGCLLDDGLEGL FEDIDTSMYDNELWAPASEGLKPGPEDGPGKEAPELDEAELD YLM DVLVGTQALERPPGPGR

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327	1066	1844	337	LQEVKARRNTLHKEKDHLVNDYEQNMKLLQTKYDADINLLKQE HALSASKASSMIEELEQNVQQLKQQLQESELQQRQQLRDQENK FQMEKSHLKHIEYKKAHDLQSELDKGKEDTQKKIHKFEEALKW KKWRQI*LDPN/LLREKQSKFEFLWQLEDIRQRYEQQIVELKLE HEQEKTHLLQQHNAEKDSLVRDHEREIENLEKQLRAANMEHEN QIQEFKKRDAQVIADMEAQVHKLREELINVNSQRKQQLVELGL LREEEKQRATREHEIVVNKLKAESEKMKIELKKTHAETEMTL EKANSKLKQIEKEYTQKLAKSSQIIAELQTTISSLKEENSQQQ LAAERRLQDVRQKFEDEKKQLIRDNDQAIKVLQDELENRSNQV RCAEKKLQHKELESQEQITYIRQYETKLKGLMPASLRQEL TISLKSQVNFLOKRASILQEE/RDYISRQKVQPISR*LHERM QMRISRLCCGTSSSRFEDLDIVNCBISGIF
328	1067	1149	238	VINLVYLISPRPELKPVDKESEVVMKFPDGFKEKFSPPILQLD EVDFFYDPKHVIFSRLSVSADLESRICVVGENGAGKSTMLKLL LGD LAPVRGIRHAHRNLKIGYFSQHHV\EQL\DLNVQCLWELA GHASFPQ\RPEEY\RHQLGFGMGISGEL\AMRPLCQPVLGAR KKPKWPFQMDYCPAPTFYIL\DEPTN\HLGHGRAIEALGPCL QTISGVGVILVSHE*SALSRLVCRE\LWVC*G\GGVTRVERKD FDQYRALLQGTVSAREGFPLGPPRLKDSPRDMGLVSQTPWGH VGYPLPGRG
329	1068	26	674	CSAVEVKMAARTAFGAVCRRLWQGLGNFSVNTSKGNTAKNGGL LLSTNMKWVQFSNLHVDVPKDLTKPVVTISDEPDILYKRLSVL VKGHDKAVLDSYEFYFAVLAKELGISIKVHEPPRKIERFTLLQ SVHIYKKHRVQYEMRTLYRCLELEHLEHTGSTADVLEYIQRLP EGVAMEVTKFCFFIFL\TQLEQLPEHIKEPIWETLSEEKESK S
330	1069	2105	1283	DFWDTAGQERFQSMHASYYHKTHACIMVFDVQRKVTHRNLSW YTELREFRPEIPCIIVVANKIDGGAIPAPGC*QFTGDLPSYISS SIPRAGNLQ*LVLPPTIRYNPWL VACILPTL*RSQLSRPALEP RHRSLITELFLGPVSQSSLPILPLSGMKASSGPPLQTFPPLDR QTNVLPSTLY\ADINVTQKSFNFAKKFSLPLYFVSAADGTNVVK LFNDAIRLAVSYKQNSQDFMDEIFQELENFSLEQEEDVDPQE QSSSIETPSEEVASPHS
331	1070	1	1109	GATPLGSVGGRTGKMDAATLT YDTLRFARFEDFPETSEPVWIL GRKYSIFTEKDEILSDVASRLWFTYRKNPFAIGGTGPTSDTGW GCMLRCGQMIFAQALVCRHLGRDWRWTQRKQPD SYFVSLNAF IDRKDSYYSIHQIAQMGVGEKSGIGQWYGENTVAQVLKKLAVF DTWSSLAHVHIAMDNTVMEEIRRLCRTSVPCAGATAFPADSDR HCNGFPAGAEVTNRPSWPRLVLLIPLRLGLTDINEAYVETLK HCFM\MPQSLGVIGGKPN SAH\YFIG*VG\BELIYLDPHTTQ AVEPTDGCFIGPDES FHCQHPPCRMSIAELDPSIAVVRGGHLS TQAFGAECCLGMTRKTFGFLRFFFSMLG
332	1071	39	284	ALCVVPFNTFHN\DFLLLDKEGTLDPVMSFSSTHWT TIGPADM FFS\FRQHYKNFKSHGTNP SKSVWAHATCQSCAFPNLLGW

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333	1072	2	1484	TRLAEFGTRDPACAPCEQQCEPGGPQGYSCHCRLGFRPAEDD PHRCVDTDECQIAGVCQQMCVNYVGGFECYCSEGELEADGIS CSPAGAMGAQASQDLGDELDDGEDEDEDEAWKAFNGGWTEM PGILWMEPTQPPDFALAYRPSFPEDREPQIPYPEPTWPPPLSA PRVPYHSSVLSVTRPVVVSATHPTLPSAHQPPVIPATHPALSR DHQIPVIAANYPDLP SAYQPGILSVSHSAQPPAHQPPMISTKY PELFFPAHQSPMFPDTRVAGTQTTHLPGIIPNHAFLVTTLGAQ LPPQAPDALVLRQTATQLPIIPTAQPSLTTSRSPVSPAHOIS VPAATQPAALPTLLPSQSPTNQTSPISPTHPSKAPQIPREDG PSPKLALWLPSPAPTAAPTALGEAGLAHESQRDDRLLVALLV PTCVFLVLLALGIVYCTRCGPHAPNKRITDCYRWVIHAGSKS PTEPMPPRGSLTGVQTCRTSV
334	1073	1	1406	LRVRRRPHLPAPPALRARRSDRRSSRAPAAFFPRPPHASPAFG PAMAQAVWSRLGRILWLACLLPWAPAGVAAGLYELNLTDDSPA TTGAVVTISASLVAKDNGSLALPADAHLYRFHWIHTPLVLTGK MEKGLSSTIRVVGHVPGEFFVSVVWTAADCWMCQPVARGFVVL PITEFLVGDVLTQNTSLPWSSYLTKTVLKVSFLLHDPNLF KTALFLYSWDFDGTQMVTEDSVYYNYSIIGTFTVKLKVVAE WEEVEPDATRAVKQKTGDFSASLKLQETLRGIQVLGPTLIQTF QKMTVTLNFLGSPPLTVCWRLKPECLPLEEGECHPVSVASTAY NLTHTRDPGDYCFISIRAENIISKTHQYHKIQVWPSRIQPAVF AFPCATLITVMLAFIMYMTLRNATQQKDMVENPEPPSGVRCCC QMCCGPFLLETPSEYLEIVRENHGLLPPLYKSVKTYTV
335	1074	1	866	VVEFAFQLSSVSVCCLTVSFGWQLGTVSSCLSRDWFLLKGNLLII IVSVLIILPLALMKHLGYLGYTSGLSLTCMLFFLVSVIYKKFQ LGCAIGHNETAMESEALVGLPSQGLNSSCEAQMFTVDSQMSYT VPIMAFVCHPEVLPITYELCRPSKRRMQAVANVSIGAMFCM YGLTATFGYLTFFYSSVKAEMLMYSQKDPILLCVRLAVLLA\V TLTVPVVLFPIRRALQQLLFPKGAFSWPRHVAIALILLVLVNV LVICVPTTRDIFGVIGSTSAPSLIFILPSCI
336	1075	3	825	GAGSKSSMMQLMHLESFYEK\PPPGLIKEDDTKPEDCIPDPVG NEHAREFLAHTPTKGLWMPLEKEVKVKH/CTPHWIAS*FLGDG KFIPKATRLKDVVSN*FTCLFWDLTRFIHDCIFF*NWSLMNK NFNIY*FFISLR*NTLILQKYFPFSLLLGWHCKWYGHRTGYK ECPFFIKDNQKLQQFRVAHEDFMYDIIRDNKQHEKNVRIQQLK QLLEDSTSGEDRSSSSSSSEGKEKHKKKKKKEKHKKKKKKKK KKRKHKSSKSNEGSDSE

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337	1076	3	2451	ETAGAAAENMLGSLCLPGSGSVLLDPCTGSTISETTSEAWSV EVLPSDSEAPDLKQEERLQELSCSGLGSTSDDTDVREVSSRP STPGLSVVSGISATSEDI PNKIEDLRSECSSDFGKDSVTSPD MDEITHDFLYILQPKQH FQHIEAEADMRIQLSSSAHQLTSPPS QSESLAMFDP LSSHEGASAVVRPKVHYARPSHPPDPPILEG AVGGNEARLPNFGSPMF* LPAEMEA FKQRHS /YTPERLVRSR S \DIVSSVRRPMSDPSWNR RP \GNEERELPPAAI GATSLVAA PHSSSSSSPSKDSRGETEERKDSDEKSDRNRPWKRKFVSAM PKAPI PFRKKEKQEKDKDDLGPDRFSTLTDDPS PRLSAQAQVA EDILDKYRNAIKRTSPSDGAMANYESTEVMDGESAHDS PRDE ALQNI SADDLPDSASQAHPQDSAFSYRDAKKLR LALCSADS VAFPVLT \HSTRNGLPDHTDPEDNEIVCF LKVQIAEAINLQDK NLMAQLQETMRCVCRFDNR TCRKLLASIAEDYRK RAPIYAYLT RCRQGLQTTOAHLERLLQRVLRDKEVANRYFTTVCVRLLESK EKKIREFIQDFQKLTAADDKTAQVEDFLQFLYGAMAQDVIWQN ASEEQ LQDAQLAIERSVMNRI FKLA FYPNQDGDILRDQVLHEH IQRLSKVVTANHRALQIPEVYLREAPWPSAQSEIR TISAYKTP RDKVQCILRMCSTIMNLLSLANEDSVPGADDFVPVLVFLIKA NPPCLLSTVQYISSFYASCLSGEESYWWMQFTA AVEFIKTIDD RK
338	1077	536	1305	WPMSLARGHGDTAASTAAPLSEEGEVTSG LQALAVEDTGGPSA SAGKAEDEGEGGREETEREGSGGEEAQGEVPSAGGEEPAEEDS EDWCVP CSDEEVELPADGQPPMPPSEIQRLYELLA AHGTLEL QAEILPRRPPTPEAQSEEERSDEEPEAKEEEEEKPHMPTEFDF DDEPVT PKDSLIDRRRTPGSSARSQKREARLDKVLSDMKRHHK LEEQILRTGRDLFSLDSEDPSASPPLRSSGSSLFPRQRKY
339	1078	2	1771	LGRGTFGQVV*CWKRG TNETVAIKILKNHPSYARQQIEVSIL ARLSTESADDYNFVRAYECFQHKNH TCLVFEMLEQNLYDFLKQ NKFSPLPLKYIRPVLOQVAT ALMKLKSGLI HADLKPENIMLV DPSRQPYRVKVIDFGSASHVSKAVCSTY LQSRYYRAPEIILGL PFCEAIDMWSLGCVIAELFLGWPLYPGASEYDQI /RYISQTQ LPAEYLLSAGTKTTRFFNRD TDSPLYLWRLKTPDDHEAETGIK SKEARKYIFNCLDDMAQVNMTTDLEGS DMLVEKAVRREFIDLL KKMLSIDSVKRFSPVGS LNHPFVTMSLFLDFPHSTHV KSCFQN MEICKRRVNM YDTVNQSKTPFITHVAPSTSTNL TMTFNNQLTT VHNQPSAASMAAVAQRSMPLQTGT AQICARPD PFQQALIVCPP GFQGLQASPSKHAGYSVRMENAVPIVTQAPGAQPLQIQPGLLA QQAWPSGTQQIILLPPAWQQLTG VATHTSVQHA AVIPETMAGTQ QLADWRNTHAHGSHYNPIMQQPALLTGHVTL PAAQPLNVGVVAH VMRQQPTSTTSSRKS KQHLYCGRARVSKIASR

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340	1079	2	2721	EFAICRYPLGMSGGQIPDEDITASSQWSESTAACYGRLDSEEG DGAWCPEIPVEPDDLKEFLQIDLHITLHFTLVGTQGRHAGGHG IEFAPMYKINYSRDGTRWISWRNRHGKQVLGDGNSNPYDIFLKD LEPPIVARFVRFPVTDHSMNVCMRVELYGCWVLDGLVSYNAP AGQQFVLPGGSI IYLNDSVYDGA VGYSMTEGLGQLTDGVSGLD DFTQTHEYHVWPGYDYVGWRNESATNGYIEIMFEFDRIRNFTT MKVHCNNMFAKGVKIFKEVQCYFRSEASEWEPNAISFPLVLDD VNPSARFVTVP LHHMASAIKCQYHFADTWMMFSEITFQSDAA MYNNSEALPTSPMAPTTYDPM LKVDDSNTRILIGCLVAIIFIL LAIIVII LWRQFWQKMLEKASRRMLDDEM TVSLSPSDSSMFN NNRSSSPSEQGSNSTYDRIFPLRPDYQEPSRLIRKLPEFAPGE EESGCSGVVKPVQPSGPEGVPHYAEADIVNLQGVGTGNTYSVP AVTMDLLSGKRCGCGREFPPGKLLTFKEKLGEQVFGVHLCEV EGMEKFKDKDFALDVSANQPVLVAVKMLRADANKNARNDFLKE IKIMSRLKDPNI IHL LSV CITDDPLCMITEYMENGDLNQFLSR HEPPNSSSSDVRTVS YTNLFKMATQIASGMKYLSSLFNVHRDL ATRNCLVGKNYTIKIADFGMSRNLYSGDYRIQGRAVLPIRWM SWESILLGKFTTASDVWAFG\VTLWE\TFTFCQRKGPYS\QLS \DETGY* RNTGEFFPRPKGGQTYLPSTSPFVPDSCVIKMLLSC WRRDTKNRPSFQEIHL LLLQGGDERCCQCLAMFLRLRSSLQDL PLTHAYATPSGHLMLKLRDRGLFALPSFPGHPHSLPLTHIYFFF FTLKN
341	1080	916	3	CSASPLRPGLLAPDLLYLPAGQPRRPEAEPGQKPVVPTLYVT EAEAHSPALPGLSGPQPKWVEVEETIEVRVKMGPGQVSPTE VPRSSSGHLFTLPGATPGGDPNSNNSNNKLLAQEAWAQGTAMV GVREPLVFRVDARGSVDWAASGMGSLEEEGTMEEEAGEEEGEDG DAFVTEESQDTHSLGDRDPKILTHNGRMLTLADLEDYVPGEGE TFHCGGPGPGAPDDPPCEVSVIQREIGEPTVG\SLCCSAWGMH WVPEALSASLGLSPMGR\HHRDPRSVALRAPSSCGRPLGLW AVLPG
342	1081	862	444	QGLAAEFLQVPAVTRAYTAACVLTAAVQLELLSPFQLYFNPH LVFRKFQAPFLPWALMGFSLLLGNSILVDLLGIAVGHIYYFLE DVFPNQPGGKRLQLTPGFLGLQSSKAPAGSSSLTIWTQQSQGGP GTAGELAAPS

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343	1082	3658	337	EKNALEPTVYFGMGV*APQVPRFQQRITGYQYYLQLRKDIWEE GIPCTLEQPIHLAGLAVQAI FGD F DQYESQDFLQKFALFPVGV LQDEKVL E EATQKVAL LHQYRGLTAPDAEMLYMQE VERMDGY GEESYPAKDSQGS D I S T G A C L E G I F V K H K N G R H P V V F R W H D I A N M S H N K S F F A L E L A N K E E T I Q F Q T E D M E T A K Y I W R L C V A R H K F Y R L N Q C N L Q T Q T V T V N P I R R R S S S R M S L P K P Q P Y M P P P P \ Q L H Y N G H Y T E P Y A S S Q D N L F V P N Q E G \ Y Y G Q F Q T S L N R A Q I D F N G R I R \ N A S V Y S A H S T N S L N N P Q P Y L Q P S P M S S N P S I T G S D V M R P D Y L P S H R H S A V I P P S Y R P T P D Y E T V M K Q L N R G L V H A E R Q S H S L R N L N I G S S Y A Y S R P A A L V Y S Q P E I R E H A Q L P S P A A A H C P F S L S Y S F H S P S P Y P Y P A E R R P V V G A V S V P E L T N A Q L Q A Q D Y P S P N I M R T Q V Y R P P P P Y P P P R P A N S T P D L S R H L Y I S S S N P D L I T R R V H H S V Q T F Q E D S L P V A H S L Q E V S E P L T A A R H A Q L H K R N S I E V A G L S H G L E G L R L K E R T L S A S A A E V \ A P R A V S V G S Q P \ S V F T E R T Q R E G P E E A E G L R Y G H K K S L S D A T M L I H S S E E E E D E D F E E E S G A R A P P A R A R E P R P G L A Q D P P G C P R V L L A G P L H I L E P K A H V P D A E K R M M D S S P V R T T A E A Q R P W R D G L L M P S M S E S D L T T S G R Y R A R D S L K K R P V S D L L S G K K N I V E G L P P L G M K K T R V D A K K I G P L K L A A L N G L S L S R V P L P D E G K E V A T R A T N D E R C K I L E Q R L E Q G M V F T E Y E R I L K K R L V D G E C S T A R L P E N A E R N R F Q D V L P Y D D V R V E L V P T K E N N T G Y I N A S H I K V S V S G I E W D Y I A T Q G P L Q N T C Q D F W Q M V W E Q G I A I I A M V T A E E E G G R E K S F R Y W P R L G S R H N T V T Y G R F K I T T R F R T D S G C Y A T T G L K M K H L L T G Q E R T V W H L Q Y T D W P E H G C P E D L K G F L S Y L E E I Q S V R R H T N S T S D P Q S P N P L L V H C S A G V G R T G V V I L S E I M I A C L E H N E V L D I P R V L D M L R \ Q Q R M M L V Q T L C Q Y T F V Y R V L I Q V P E K A P R L I L S S P Q F P Y G A Q S C E A F T A
344	1083	6	304	RKKQKLAEE*VELSKLADLKDAEAVQKFFLEEI*L\GEEILAK GVDHLTNPSAVCGQPQWLLQVLQQTLPLEVIQMLLT KPLPVNQ RLVSAG/SLAKDDVE
345	1084	1255	635	SFCLHEFGWL GSSPQSDHPVPALLGLGAFVHHSLLQVHSSPGA GPVSFLFLGESCS PVDEPRCVPSCAFGLSCFP LLNSAALERG LFFFVFFFLESGSCQVARAGVRD/RDRGSLQPPPPGLKQFCL SLPSRWDHRHPPPLRVP*FVFVFLVELGFHHVAQAGLKLTL S DPPAPASHSAGITGVSQRDQPVFLRWASCSSELVG
346	1085	116	415	EGFPGRSLSGGLCCRLRRRFPIDGYRPRRRRRWSCCPSGVRPV RRMSQKSWIESTLT KREC V Y I I P S S K D P H R C L P G C Q I C Q Q L V R R G F T V L A R M V S I S
347	1086	918	760	QNSTCLTAQTHSLLQHQP LQLTTLLDQYIREQREKDSVMSANG KPDPTV PDS



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348	1087	1	750	LNPWKNALQDFCLPFLRITSLLQHHLFGE DLPSQEEEEFSVL ASCLGLLP TFYQTEHPFISASCLDWPVPAFDIITHWC FEIKSF TERHAEQ GKALLIQESKWKLP HLLQLPENYNTIFQYYHRKTCS VCTKVPKDP AVCLVCGTFVCLKGLCKQ QS YCECVLHSQNCGA GTGIFLLINASV I IIRGHRFCLWGSVYLD AHGEEDRDLRRGK PLYICKERYKVLEQQWISHTFDHINKRWGPHYNGL
349	1088	3	1374	KGQLVNLLPPENFPWC GGSQ GPRMLRTC YVLC SQAGPRSRGWQ SLSFDGGA FHLKGTGELTRALLVLR LCAWPPLVTHGLLLQAWS RRLGSR LSGAFLRASVYQG FVAGETAEEVKGC VQQLRTL SLR P LLA VPTEEEPDSAAKSGEAWYEGNLGAMLCVDLSRGLLEPP SLAEASLMQLKV TALTSTR LCKELASWVRRPGASLELSPERLA EAMDSGQNLQVSCLNAEQNH L RASLSRLHRVAQYARAQH VRL LVDAEYTS LNPALSLLVAALAVRWNSPGE GGPWWNTYQACLK DTFERLGRDAEAAHRA GLAFGVKLV RGAYLDKERAVAQL\HG\ MEDPPTQADYEATS\QSYS\RCLEMLTHVARHGPMCHLMVAS HNEESVRQATK\GQAGYVVYKSI PYGSLEEVIPYLI RRAQENR SVLQGARREQELLSQKLWRRLLPGCRRIPH
350	1089	1036	306	VVEFGEMSTARAPEGLRWFQLYVHPDLQLNKQLIQRVESLGFK ALVITLDT P VCGNRRHDIRNQLRRNLTLTDLQSPKKGN AIPYF QMTPISTSLCWN DL SWFQSITRLPIILKGILTKEDAELAVKH N VQGIIVSNHGG RQLDEVLASIDALTEVGAAE*GNMKYYLDAGV RTGNDVQKALALGAKCIFLGRPILWGLACKGEHGVKEVLNILT NEFHTSMA\LTGCRSVAEINRNLVQFSRL
351	1090	1229	957	FFLRWSFTL\LPRL E/CQWNLGSLQPPPPGFK*SSCLRLLS WGLQVPTSM LG*FFCIFSREGISPCWPGWSQTPKVIHLPRPPR VLRLQA
352	1091	1145	365	LLCFVHTALQSFQGE LYEPHVVIAIVVFLVKLGICK*RASWRK KVTLVVK*S/LKICFTKYGSCYHPGEKSSSWLFN*RMVNDCLA TSCSNRSFVIQQIPSSNLFMVVVDSSCLCESVAPITMAPIEIR YILLCAGPLTTTETS KGYQW*GNLGEKY*RRKITSFPLLERES S*ESCHCQILTSEM QSRKKQSLETCLNYSQHNE SLK CERLKAQ KIRRRPESCHGFHPEENARECGGAPSLQAQTVLLLLPLLLMLF SR
353	1092	1140	790	VPSPTHDPKPAEAPMPA*PAPPGPASPGGALEPPAAARAGGSP TAVRSILTKERRPEGGYKAVWFGEDIGTEADVVLNAPTLDVD GASDSGSGDEGEGAGRGGGPYDAPGGDDSYI

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354	1093	3	2293	LISLAGPTDDIQSTGPOVHALNILRALFRDTRLGENIIPYVAD GAKAAILGFTSPVWAVRNSSTLLFSALITRIFGVKRAKDEHSK TNRMTGREFFSRFPPELYPFLKQLETVANIVDSMGEPNRHPS MFLLLLVLRLYASPMDDGTSSALSMGPFVFPFIMRCGHSPVYHS REMAARALVPFVMIDHIPNTIRTLLSTLPSCTDQCFRQNHIG TLLQVFLVQAYSDSKHGTNSDFQHELTDTVCTKAKLWLAKR QNPCLVTRAVYIDILFLLTCCLNRSKDNQPVLES LGFWEEVR GIISGSELITGFPWAFKVPGLPQYLQSLTRLAIAAVWAAAAS GERETNPISFSQLLESAPFEVRSLTLEALLEKFLAAASGLGE KGVPPLLCNMGKFLLLAMKENHPECFKILKILHCDMPGEWL PQTEHCVHLTPKEFLIWTMDIASNERSEIQSVARLASKVISH HMQTCVENRELLAELKQWVQLVILSCEDHLPTE SRLAVVEVL TSTTPLFLTNPHPILELQDTLALWKCVLTLLQSEEQAVRDAAT ETVTTAMSQENTCQSTEFACQVDASIALALALAVLCDLLQQW DQLAPGLPILLGWLLGESDDL VACVESMHQVEEDYLF EKA EVN FWAETLIFVKYLCKHLFCLLSKSGWRPPSPENMLCHLQRMVSEQ C\HLLSQFFRELPPAAEFVKTFEFTRLRIQEERTLACLRL LAF LEGKEGEDTLVLSVWDSYAESRQLTLPRTEAAC
355	1094	25	1265	HAFRPIALQRGVSFRGCSNQYAESRRLQGESGSRFAHLMESL LQHLDRFSELLAVSSTTYVSTWDPATVRRALQWARYLRHIHRR FGRHGPIRTALERLRLHNQWRQEGGFGRGPVPGLANFOALGHCD VLLSLRLLENRALGDAARYHLVQQLFPGPGVRDADEETLQESL ARLARRRSVHMLRFNGYRENPNLQEDSLMKTQAE LLLERLQE VGKAEAEERPARFLSSLWERLPQNNFLKVI AVALLPPLSRRPQ EELEPGIHKSPGEGSQVLVHWLLGNSEVF AAFCRALPAGLLTL VTSRHPALSPVYLGLLTDWGQRLHYDLQKGIWVGTESQDVPWE ELHNRFSQSLCQAPPPLKDKVLTALETCKAQDGD FEEFGLSIWT DLLLALRSGAFRKRQVLGLSAGLSSV
356	1095	3	1027	SHLIQHQRHT*E*AHCEGCKGAFSQTSLIQHHKMRKEKS YECNEYEGSFSHSSDLILQQEVLTQKAFDCDVWEKNSSQRAH LVQHQSHTKE/K/PHECNEDGKIF/NQIQ/LIQHLRVHTRE K/YVCTACGKAFSHSSAIAQHQIIHTREKPSECD E*RGKISVK LLIDSC/RIYTSEKSYKCI ECGKFFMLLVFSYLSHIWRIHMG I KFHCCNECEKAISQRNYLV*YQIHAMQKDYKCN/EACMCVRRF SHNPTLIQHQRHT*ENLFGCSK/C/GRSFNRSLSLCHIRIS I/RRQEFDVTQMEKLD TTFQA/STQHRNNGEKIVDYLFMKLLI HSPNLFHCTKI
357	1096	2638	2867	AVTLTAKICSFTPEPSETMSPFAGTNNRHAALRAVTLFPVKVC SFTPEPARSRTHQKEETPNTSEHQKEQTPEAPP

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358	1097	4747	4550	<p>MAYSWQTDPNPNESHEKQYEHQEFLFVNQPHSSSQVSLGFDQI  VDEISGKIPHYESEIDENTFFVPTAPKWDSTGHSLNEAHQISL  NEFTSKSRELSWHQVSKAPAIGFSPSVLPKPQNTNKECSWGSP  IGKHHGADDSRFSILAPSFTSLDKINLEKELENENHNYHIGFE  SSIPPTNSSFSDFMPKEENKRSGHVNIVEPSLMLLKGSLOPG  MWESTWQKNIESIGCSIQLVEVPQSSNTSLASFCKNVKKIRER  YHAADVNFNSGKIWSTTTAFPYQLFSKTKFNIHIFIDNSTQPL  HFMPCANYLVKDLIAEILHFCTNDQLLPKDHILSVWGSEEFLO  NDHCLGSHKMFQKDKSVIQLHLQKSREAPGKLSRKHEEDHSQF  YLNQLELFMHITWKVSRQCLLTIRKYDFHLKYLLKTQENVYNI  IEEVKKICSVLGCVETKQITDAVNELSLILQRKGENFYQSSET  SAKGLIEKVTELSTSIYQLINVCNSFYADFQPVNVPRTSY  LNPGLPSHLSFTVYAAHNIPETWVHRINFPLEIKSLPRESMLT  VKLFGIACATNNANLLAWTCLPLFPKEKSLGSMFLFSMTLQSE  PPVEMITPGVWDVSQSPVTLQIDFPATGWEYMKPDSEENRSN  LEEPLKECIKHIALRSQKQTPLLLSEEKKRYLWFYRKYCNEN  CSLPLVLGSAPGWDERTVSEMHTILRRWTFSQPLEALGLLTSS  FPDQEIIRKVAVQQLDNLNDELLEYLPQLVQAVKFEWNLESPL  VQLLHLRSLSQSIQVAHRLYWLKNAENEAYFKSWYQKLLAALQ  FCAGKALNDEFSKEQKLIKILGDIGERVKSASDHQRQEVLLKE  IGRLEEFFQDVNTCHLPLNPALCIKIDHDACSFTSNALPLK  ITFINANLMGKNISIIFKAGDDLQDMLVLQLIQVMDNIWLQE  GLDMQMIYRCLSTGKDQRLVQMPDAVTLAKIHRHSGLIGPL  KENTIKKWFSSQHNHLKADYEKALRNFFYSCAGWCVVTFILGVC  DRHNDNIMLTKSGHMFHIDFGKFLGHAQTFGGIKRDRAPFIFT  SEM\EYFITEGG\KNPQHFQDFV\ELCCRAYNIIRKHSQLLL\  NLL\EMMLYAG\LPELSGI\QDLKYVYNNLRPQDTDLEATSHF  TKKIKESLECFPVKLNLIHTLAQMSAISPAKSTSQTFFQESL  LLSTTRSIERATILGFSKKSNNLYLIQVTHSNNETSLTEKSFE  QFSKLHSQLQKQFASLTLPPEFPHWWHLPTNSDHRRFRDLNHY  MEQILNVSHEVTNSDCVLSFFLSEAGQQTVEESSPVYLGEKFP  DKKPKVQLVISYEDVKLTILVKHMKNIHLPDGSAPSARHVEFYL  LPYPSEVRRRRTKSVPKCTDPTYNEIVVYDEVTELQGHVMLLI  VKSKTVFVGAINIRLCSVPLDKEKWYPLGNSII*PLLLFYTSN  FMQSVLH</p>
359	1098	679	346	<p>FFLRWSLDSVTQAGVQSHDLSSLQPPPPGFKQSSFLGLPSSWE  *RWVPPCANFFVFLVETGFRHVGQAGLELLTSNDLPVSACQS  AGITGVTTVPQRKSMILYEVTICYP</p>

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360	1099	2	1601	FVREIRGPAVPRLTSAEDRHRHGPHAHSPELQRTGRDYSLDYL PFRLWVGIIWVATFCLVLVATEASVLVRYFTRFTEEGFCALISL IFIYDAVGKMLNLTHTYPIQKPGSSAYGCLCQYPGPGGNESQW IRTRPKDRDDIVSMDLGLINASLLPPPECTRQGGHPRGPGCHT VPDIAFFSLLLFLTSFFFAMALKCVKTSRFFPSVVRKGLSDFS SVLAAILLGCGLDAFLGLATPKLMVPREFKPTLPGRGWLVSFPG ANPWWWSVAAALPALLLSILIFMDQQITAVILNRMEYRLQKGA GFHLDLFWVAVLMLLTSALGLPWVVSATVISLAHMDSLRRESR ACAPGERPNFLGIREQRLTGLVVFLT GASIFLAPVLKFI PMP VLYGIFLYMGVAALSSIQFTNRVKLLL\MPAKHQPDLLLLRHV PLTRVHLFTAISFA\CLGLLW\IIKSTPAATIFPLMLLGLVGV RKALERVVFS PQELLWLDELMP EEERSIPEKGLEPEHSFSGSDS EDSELMYQPKAPEINISVN*LE*EFVREIRGPAVPRLTSAEDR HRHGPHAHSPELQRTGRDYSLDYLPFRLWVGIIWVATFCLVLVA TEASVLVRYFTRFTEEGFCALISLIFIYDAVGKMLNLTHTYPI QKPGSSAYGCLCQYPGPGGNESQWIRTRPKDRDDIVSMDLGLI NASLLPPPECTRQGGHPRGPGCHTVPDIAFFSLLLFLTSFFFA MALKCVKTSRFFPSVVRKGLSDFS SVLAAILLGCGLDAFLGLAT PKLMVPREFKPTLPGRGWLVSFPGANPWWWSVAAALPALLLSI LIFMDQQITAVILNRMEYRLQKGAGFHLDLFCVAVLMLLTSAL GLPWVVSATVISLAHMDSLRRESRACAPGERPNFLGIREQRLT GLVVFLT GASIFLAPVLKFI PMPVLYGIFLYMGVAALSSIQF TNRVKLLLDASKTPARPATLAACASDQGPPLHSHQLCPVWGCF GIIKSTPAATIFPLMLLGLVGV RKALERVVFS PQELLWLDELMP EEERSIPEKGLEPEHSFSGSDSEDSSELMYQPKAPEINISVN

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361	1100	1	2636	MGLKARRAAGAAGGGGDDGGGGGGGAANPAGGDAAAAGDEERKV GLAPGDVEQVTLLALGAGADKDGTLLEGGQRDEGQRRTPQGIG LLAKTPLSRPVKRNNAKYRRIQTLYDALERPRGWALLYH\AL VFLIVLG\CLILAVL\TTFKEYETVSGDWLLLLLETFAIFFIGA EFALRIWAAGCCCRYKGWRGRLKFARKPLCMLDIFVLIASVPV VAVGNQGNVLATSLRSLRFLQILRMLRDGPGEAGTWKLLG\SA ICAHŠKELITAWYIGFLTLILSSFLVYLVEKDVPEVDAQGEEM KEEFETYADALWWGLITLATIGYGDKTPKTWEGRLIAATFSLI GVSFFALPAGILGSLALKVQEQHRQKHFEKRRKPAAELIQAA WRYATNPNRIDL VATWRFYESVVSFPFFRKEQLEAASSQKLG LLDRVRLSNPRGSNTKGKLF TPLNVDAIEESPSKEPKPVGLNN KERFRTAFRMKAYAFWQSSSEDAGTGDPMAEDRGYGNDFPIEDM IPTLKAAIRAVRILQFRLYKKKFKETLRPYDVKD VIEQYSAGH LDMLSRIKYLQTRIDMIFTPGPPSTPKHKKSQKGS AFTFPSQQ SPRNEPYV\ARPST\SEI\EDQRH*WGKFVKS LKGQV\QGLGR KLDFLVDMMHMQHMERLQVQVTEYYPTKGTSSPAEAEKKEDNRY SDLKTIICNYSETGPPEPPYSFHQVTIDKVSPYGFFAHDPVNL PRGGPSSGKVQATPPSSATTYVERPTVLPILTL LDSRVSVCHSQ ADLQGPYSDRISPRQRRSITRSDTPLSLMSVNHEELERSPSG FSISQDRDDYVFGPNGGSSWMREKRYLAEGETD TDTDFFTPSG SMP\LSSTGDGISDSVWTPSNKPI

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362	1101	1	5433	<p>RTRGIIIEFDPKYTAFEVEEDVGLIMIPVVRHLHGTGYVVTADDFISQSSSASPGG VDYILHGSTVTFQHGQNLISFINISIIDNESEFEETPIELLTGATGGAVLGRH LVSRIIIAKSDSPFGVIRFLNQSKISIANPNSTMILSLVLERTGGLLEIQVN WETVGPNSQEALLPQNRDIADPVSGLFYFGEGEGGVRTIILTIYPHEEIEVEE TFIIKLHLVKGEAKLDSRAKDVTLTIQEFGDPNGVVQFAPETLSKKTYSSEPLA LEGPLLITFFVRRVKGTGFEIMVYELSSSEFDITDPLSTSGFFTIADGESEA SFDVHLLPDEVPEIEEDYVIQLVSVEGGAELDLKSITWFSVYANDDPHGVA LYSDRQSIILIGQNLIRSIQINIRLAGTFGDVAVGLRISSDHKEQPIVTENAE RQLVVKDGATYKVDVVPKIKNQVFLSLGSNFTLQLVTVMLVGGRFYGMPTILQE AKSAVLPVSEKAANSQVGFESTAFQLMNITAGTSHVMISRRGTGALSVAWTT GYAPGLEIPEFIVVGNMPTLGLSLFSHGEQKRGVFLWTFPSPGWPEAFVLHL SGVQSSAPGGAQLRSGFIVAEIEPMGVFQFSTSSRNIIIVSEDTQMIRLHVQRL FGFHSDLIKVSYQTAGSAKPLEDFEPVQNGELFFQKFQTEVDFTIINDQL SEIEEFFYINLTSVEIRGLQKFDVNWSPRLNLDVSVAVITILDNDLAGMDIS FPETTVAVAVDTTILIPVETESTTYLSTSKTTTILQPTNVVAIVTEATGVAIP EKLVTLHGTFAVSEKPDVATVTANVSIHGTFSLGPSIVYIEEMKNGTFNTAE VLIRRTGGFTGNVSIITVKTGERCAQMEPNALPFRGIYGISNLTWAVEEEDFE EQTLTLIFLDERERKVSQVILDDDEPEGQEFFYVFLTNPQGAQIVEGKDDT GFAAFAMVITIGSDLHNGIIGFSEESQSGLELREGAVMRRLHLIVTRQPNRAF EDVKVFWRVTLNKTVVVLQKDGVNLMEELOQSVSGTTCTMGQTKCFISIELKP EKVPQVEVYFFVELYEATAGAAINNSARFAQIKILESDESQSLVYFVSGSRLA VAHKKATLISLQVARDSGTGLMMSVNFSTQELRSAETIGRTIISPASIGKDFV ITEGTLVFEPGQRSTVLDVILTPETGSLNSFPKRFQIVLFDPKGGARIDKVVY TANITLVSDADSQAIWGLADQLHQPVNDLILNRVLHTISMKVATENTDEQLSA MMHLIEKITTEGKIQAQFVARSRTLFYEILCSLINPKRKDTRGFSHFAELTENF AFSLLTNVTCGSPGKSKTILDSCTPLSLALHWPQQINGHKFEGKEGDIYIR IPERLLDVQDAEIMAGKSTCKLVQFTEYSSQWFIISGNLPTLKNKVLSSVK QSSQLTNDNEVLYRIYAAEPRIIPQTSCLLWNQAAASWLSDSQFCKVIEE TADYVECACLHMSVYAVYARTDNLSSYNEAFTSGFICISGLCLAVLSHFCA RYSMAFAKLLTHMMAASLGTQILFLASAYASPQLAEESCSAMAAVTHYLCLQ FSWMLIQSVNFYVVLVMDNDEHTERRYLFFLLSWGLPAFVVILLIILKGIYH QSMQIYGLIHGDLCFIPNVYALFTALVPLTCLVVFVVFVTHAYQVQKQWK AYDDVFRGRTNAAEIPILILYFALISVTWLGGLHMAVYRHWMLVLFVFNLS QLL\YPLFYFLL*QSSSASPGGVVDYILHGSTVTFQHGQNLISFINISIIDN ESEFEETPIELLTGATGGAVLGRHLVSRIIIAKSDSPFGVIRFLNQSKISIAN PNSTMILSLVLERTGGLLEIQVNWETVGPNSQEALLPQNRDIADPVSGLFYF GEGGGVRTIILTIYPHEEIEVEETFIKLHLVKGEAKLDSRAKDVTLTIQEF GDPNGVVQFAPETLSKKTYSSEPLALEGPLLITFFVRRVKGTGFEIMVYELSS EFDITDPLSTSGFFTIADGESEASFDVHLLPDEVPEIEEDYVIQLVSVEGGA ELDLKSITWFSVYANDDPHGVAFLYSDRQSIILIGQNLIRSIQINIRLAGTF GDVAVGLRISSDHKEQPIVTENAEERQLVVKDGATYKVDVVPKIKNQVFLSLGSN FTLQLVTVMLVGGRFYGMPTILQEAKSAVLPVSEKAANSQVGFESTAFQLMNI TAGTSHVMISRRGTGALSVAWTTGYAPGLEIPEFIVVGNMPTLGLSLFSHG EQKRGVFLWTFPSPGWPEAFVLHLSGVQSSAPGGAQLRSGFIVAEIEPMGVFQ FSTSSRNIIIVSEDTQMIRLHVQRLFGFHSDLIKVSYQTAGSAKPLEDFEPVQ NGELFFQKFQTEVDFTIINDQLSEIEEFFYINLTSVEIRGLQKFDVNWSPR LNLDFSVAVITILDNDLAGMDISFPETTVAVAVDTTILIPVETESTTYLSTSK TTTTILQPTNVVAIVTEATGVAIPEKLVTLHGTFAVSEKPDVATVTANVSIH TFSLGPSIVYIEEMKNGTFNTAEVLIRRTGGFTGNVSIITVKTGERCAQMEP NALPFRGIYGISNLTWAVEEEDFEQTLTLIFLDERERKVSQVILDDDEPEG QEFFYVFLTNPQGAQIVEGKDDTGFAAFAMVITIGSDLHNGIIGFSEESQSG LELREGAVMRRLHLIVTRQPNRAFDVKVFWRVTLNKTVVVLQKDGVNLMEE QSVSGTTCTMGQTKCFISIELKPEKVPQVEVYFFVELYEATAGAAINNSARF AQIKILESDESQSLVYFVSGSRLAVAHKKATLISLQVARDSGTGLMMSVNFST QELRSAETIGRTIISPASIGKDFVITEGTLVFEPGQRSTVLDVILTPETGSLN SFPKRFQIVLFDPKGGARIDKVVGTANITLVSDADSQAIWGLADQLHQPVNDL ILNRVLHTISMKVATENTDEQLSAMMHLIEKITTEGKIQAQFVARSRTLFYEIL CSLINPKRKDTRGFSHFAELTENFASLNTVTCGSPGKSKTILDSCTPLSLI LALHWPQQINGHKFEGKEGDIYIRIPERLLDVQDAEIMAGKSTCKLVQFTEYS SQWFIISGNLPTLKNKVLSSVKQSSQLTNDNEVLYRIYAAEPRIIPQTS LCLLWNQAAASWLSDSQFCKVIEETADYVECACLHMSVYAVYARTDNLSSYNE AFTSGFICISGLCLAVLSHFCAARYSMAFAKLLTHMMAASLGTQILFLASAY ASPQLAEESCSAMAAVTHYLCLQFSWMLIQSVNFYVVLVMDNDEHTERRYLFF LLSWGLPAFVVILLIILKGIYHQSMSQIYGLIHGDLCFIPNVYALFTAL VPLTCLVVFVVFVTHAYQVQKQKAYDDVFRGRTNAAEIPILILYFALISVTW LWGLHMAVYRHWMLVLFVFNLSQLLVFVSLFTSMRSTFFSFHTGTLTSRE KKSTFVLTCLLSPDSKGLGVLCFLNTEWAFQVH</p>

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363	1102	2	2855	AAGATMERDGCAGGGSRGEGGRAPREGPAGNGRDRGRSHAAE APGDPQAAASLLAPMDVGEEPLEKAARARTAKDPNTYKVL LSVCLTTLTGCTIFGLKPKSCAKEVKSCGRCFERTFG\NCRCD AACVELG\NCCLGLPGGTCT\EP\EHIW\TCNKFRCG\EKRLT RSLCACSDDKD\RGDCLPSNLQFLCVQGE\KSWGRKNPCESH LMEP\QCP\AGFETPSLPLLIIF/SLDGFRAEYLHTWGGLLPVI SKLKKCGTYTKNMRPVYPTKTFPNHYSIVTGLYPESHGIINN MYDPKMNASFSLKSKEKFNPEWYKGEPIWVTAKYQGLKSGTFF WPGSDVEINGIFPDYKMYNGSVPFEEIRILAVLQWLQLPKDER PHFYTYLLEEDSSGHSYGPVSSEVIKALQRVDGMVGMMLMDGL KELNLHRCNLILISDHGMEQGSCKKYIYLNKYLGDVKNIKVI YGPAAARLRPSDVPDKYYSFNYEGIARNLSCREPNQHFKPYLKH FLPKRLHFAKSDRIEPLTFYLDLPQWLALNPSEKRYCGSGFHG SDNVFSNMQALFVGYGPGFKHGIEADTFENIEVYNLMCDLLNL TPAPNNGTHGSLNHLKPNVYTPKHPKEVHPLVQCPFTRNPRD NLGCSCNPSILPIEDFQTQFNLTVAEEKI IKHETLPYGRPRVL QKENTICLLSQHQFMSGYSQDILMPLWTSYTVDRNDSFSTEDF SNCLYQDFRIPLSPVHKCSFYKNNTKVSYGFLSPQLNKNSSG IYSEALLTTNIVPMYQSFOVIWRYFHDTLRLKYAEERNGVNVV SGPVFDFDYDG\RCDL\ENLRQKRRVHPVTQENFWIPNSTSF Y/VVLTSC\KDSQTPLHC\ENL\DTLGFPFCLHRDWINSETC \VHG\KHDSSW\VEEFVKCLHRA\RITGC*GTSGLSIFYQQRK EPVSDILKLKTHLPTFSQED
364	1103	657	1	TVPPPPGGPSPAPLHPKRSPTSTGEAELKEERLPGRKASCSTA GSGSRGLPPL\SPMVSSAHNPNAEIPERRKDSSTPNLPPS MMTRNTYVCTERPGAERPSSLNPGKENS SGTTPRVPPASPSH SLAPPSGERSRLARGSTIRSTFHGGQVRDRRAGGWGFFNKHA LQRAPRNAGAPSLMPGHRTVLINYGQDLKNWETCLAAPPNK HRR
365	1104	1	1313	HTLHHSSPTSEAEFVSRLSTQNYFRSLPRGTSNMTYGTNFN GGRLMIPNTGISLLIPDAIPRGKIYEIYLT LHKPEDVRLPLA GCQTLLSPIVSCGPPG\VLLTRPVILG\MDHCG\EPSPSW\S LRLKKQSCGSEWEDVLHLGEEAPSHLYYCQLEASACYVFTEQL SRYALVGEALSVAARKLKL L FAPVACTSLEYNII VYCLHDT HDALNVVVQLEKQLQGQLIQEPLVLHFKDSYHNLRSLIHDVPS SLWKSLLVSYQEI PFYHIWNGTQRYLHCTFTLERVSPSTSDL ACKLWVWQVEGDGQSFSINFNITKDTRFAELLALESEAGVPAL VGPSAFKIPFLIRQKIISLDPPCRGRADWRTLAQKLHLDLH SFFASKPSPTAMILNLWEARHFPNGNLSQLAAVAGTGAPAGRW LLSQCEAEAC
366	1105	1	343	GSAAGQVQQQQRRHQQGVTVKYDRKELRKRLVLEEWIVEQL GQLYGCEEEEMPEVEIDIDDLFDAYSDEQRASKLQEALVDCYK PTEEFIKELLSRIRGMRKLSP\PQKKS

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367	1106	2	1398	IMLDGRVRWLTPVISALWEAEMEDVIARMQDEKNGIPIRTVKS FLSKIPSVFSGSDIVQWLIKNTIEDPVEALHLGLTMAAHGYF FPISDHVLTLDKDDGTFFYRFQTPYFWPSNCWEPENTDYAVYLCK RTMQNKARLELADYEAESESLARLQRAFARKWEFIFMQAEAQAKV DKKRDKIERKILDSQERAFWDVHRPVPVPGCVNTTEVDIKKSSRM RNPHKTRKSVYGLQNDIRSHSPTHTPTPETKPPTEDELQQQIK YWQIQIDRHLKMSKVADSLLSYTEQYLEYDFLLPPDPSPNPW LSDDTTFWELEASKEPSQQRVKRWGFGMDEALKDPVGREQFLK FLESEFSENLRFWLAVEDLKKRPIKEVPSRVQEIWQEFLLAPG APSAINLDSKSYDKTTQNVKEPGRYTFEDAQEHYKLMKSDSY PRFIRSSAYQELLQAKK\KGKSLTSKRILTSLAQSY
368	1107	1	461	GTRDYPRIVNHLDHTYVTAPQAFMMFQYFVKVPTVYMKVDGE VLTNNQIYVTRHEKAAYVLMGDQGLPGVFILYELSPMMVNLTE IHTFFSLFLTIVGA\TIGGMFFEHFVINYLTHKWGLGFYFKNE NSLQGGHRTLYGVNFFMYWSLRGGS
369	1108	2	1522	SVVWNSQRQFVVRWAGCAGPCGRAVFLAFGLGLGLIEEKQAES RRAVSACQEIQAIPTQKSKPGPDPLDTRRLQGRLEEYILIGQS IGKGCSAAVYEATMPTLPQNLEVTGSTGLLPGRGEGTSAPGEG QERAPGAPAFPLAIKMMWNISAGSSSEAILNMTMSQELVPASRV ALAGEYGAVTYRKS KRGPQLAPHPNIIRVLRAFTSSVPLLP ALVDYDPDVLPSRLHPEGLGHGRTLFLVMKNYPCTLRQYLCVNT PSPRLAAMMLLQLEGGVDHLVQQGIAHRDLKSDNILELDPDG CPWLVIADFGCCLADESIGLQLPFSSWYVDRGGNGCLMAPEVS TARPGPRAVIDYSKADAWAVGAIAYEIFGLVNPFGQGAHLE SRSYQEAQLPALPESVPPDVRQLVRALLQREASKRPSARVAAN VLHLSLWGEHILALKNLKLDKMGWLLQQSAATLLANRLTEKC CVETKMKMLFLANLECETLCQAALLCSWRAAL
370	1109	105	1252	RPLRLAELPDHCYRMNSSPAGTPSPQPSRANGNINLGPSANP NAQPTDFDFLKVIGKNGYKGVLLAKRKSDGAFYAVKVLQKKS LKKKEQSHIMAERSVLLKNVRHPFLVGLRYSFQTPEKLYFVLD YVNGGELFFHLQRERRFLEPRARFYAAEVASAI GYLHSLNIY RDLKPENILLDCQGHVLTDFGLCKEGVEPEDTTSTFCGTPEY LAPEVL\RKEPYDRAVDWCLGAVLYEMLHGLPPFYSQDVSQM YENILHQPLQIPGGRTVAACDLLQSLHLDQRQLGSKADFLE IKNHVFFSPINWDDLYHKRLTPPFNPNVTGPADLKHFDPEFTQ EAVSKSIGCTPDTVASSSGASSAFLGFSYAPEDDDILDC



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371	1110	3	1608	RPQTLKGHQEKIRQRQSILPPPQGPAPIPFQHRGGDSPEAKNR VGPQVPLSEPGFRRRESQEEPRAVLAQKIEKETQILNCALDDI EWFVARLQKAAEAFKQLNQRKKGKKGKKAPAEVLTLLRARP \SEGEFIDCFQKIKLAINLLAKLQKHQNPSAAELVHFLFGPL DLIVNTCSGPDIA RSVSCPLLSRDAVDLGRHLVPKEMSLWES LGESWMRPRSEWPREPQVPLYVPKFHSGWEPPVDVLQEAPEV EGLASAPIEEVSPVSRQSI RNSQKHSPTSEPTPPGDALPPVSS PHTHRQYQPTPAMAKYVKILYDFTARNANELSVLKDEVLEVLE DGRQWWKLRSRSGQAGYVPCNILGEARPEADAGAPFEQAGQKYW GPASPTHKLPPSFPGNKDELMQHMDEVNDELIRKISNIRAQPO RHFRVERSOPVSQPLTYESGPDEVRAWLEAKAFSPRIVENLGI LTGPQLFSLNKEELKKVCGEEGVRVYSQLTMQKAFLEKQSQSGS ELEELMNKFHSMNORRGDS
372	1111	3	1046	AWHEGLVSSPAIGAYLSASYGDSLVLVATVVALLDICFILVA VPESLPEKMRPVSWGAQISWKQADPFASLKKVGKDSTVLL\IC ITVCLSYLPEAG\QYSSFF\LYLR\QVIGFG\SVKIAAFIAMV GILSIVAQTAFSLILMRSLGNKNTVLLGLGFQMLQLAWYGFSGS QAWMMWAAGTVAAMSSITFPAISALVSRNAESDQQGVAAQGIIT GIRGLCNGLGPALYGFIFYMFHVELTELGPKLNSNNVPLQGA V IPGPPFLFGACIVLMSFLAALFIPEYSKASGVQKHSNSSSGSL TNTPERGSDIEDIEPLLQDSSIWELSSFEEPGNQCTEL*TRQKV GFCIRHL
373	1112	1	1950	MAAGLATWLPFARAAAVGWLPLAQQLPPAPGVKASRGDEVLV VNVSGRRFETWKNTLD RYPTLLGSSEKEFFYDADSGEYFFDR DPDMFRHVLNFYRTGRHLHCPQECIQAFDEELAFYGLVPELVG DCCLEEYRDRKKENAEERLAEDEEAEQAGDGPALPAGSSLRQL WRAFENPHTSTAALVFYVVTGFFIAVSVIANVETIPCRGSAR RSSREQPCGERFPQAFFCMDTACVLIFTGEYLLRLFAAPSR CR FLRSVMSLIDVVAILPYYIGLLVPKNDDVSGAFVTLRVFRVFR IFKFSRHSQGLRILGYTLKSCASELGFLFLSLTMAIIIFATVM FYAEKGTNKTNFTSIPAAFWTIVTMTTLGYGDMVPSTIAGKI FGSICSLSGVLVIALPVPVIVSNFSRIYHQNRADKRRQQKV RLARIRLAKSGTTNAFLQYKQNGGLEDSGSGEEQAVCVRN RSA FEQQHHLLHCKLEKTTCHFTDELTFSEALGAVSPGGRTSRST SVSSQPVGPGSLLSSCCPRRAKRRAIRLANSTASVSRG\SMQE LDMLAGL\RRSHAP\QSRSSL\NAKPHDSLNLCDSDG\DFVAA IISIPTPPANTPDESQPSPPGGGRAGSTLRNSSLGTPCLFPE TVKISSL
374	1113	4	664	GWGKPFKDWTGGQDTGGEPALLVGAGEGRAPRLNCPSGQIRS PGPGDLSIYDNWIRYFNRSSPVYGLVP/RSKTSARIPTYHTA FDTFDYVDKFLDPGEEGDKGHPETRTGEAD*ALALSPCRR\F SSHQAVARTAGSVILRLSDSFFLPLKVS DYSETLRSFLQAAQQ DLGALLEQHSISLGPLVTAVEKFEAEAAALGQRISTLQKGSPD PLQVRML

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375	1114	1	1147	GIRGGGSLASGGPGPGHASLSQRLRLYLADSWNQCDLVALTCF LLGVGCRLTPGLYHLGRTVLCIDFMVFTVRLHLHIFTVNKQLGP KIVIVSKMMKDVFFFLFFLVWLVAYGVATEGLLRPRDSDFPS ILRRVFYRPLYQIFGQIPQEDMDVALMEHSNCSSEPGFWAHP GAQAGTCVSQYANWLVLVLLVIFLLVANILLVNLIIAMFSYTF GKVQGNSDLWKAQRYRLIREFHSRPALAPPFIVISHLRLLLR QLCRRPRSPQPSSPALEHFRVYLSKEAERKLLTWESVHKENFL LARARDKRESDSERLKRTSQKVDLALKQLGHIREYEQRKLVLE REVQQC SRVLGWAEALSRSALLPPGGPPPPDLP GSKD
376	1115	3	329	LIKLCCKSAKSCENDLEMGMNLNSKFKKTRYQAGMRNSENLTAN NTLSKPTRY/QGELKEIKQDISSLRYELLEKSQATGELADLI QQLSEKFGKLNKDHRLRVNKGKDI
377	1116	1	2043	LPLLHAGFNRRFMENSSIIACYNELIQIEHGEVRSQFKLRACN SVFTALDHCHEAIEITSDDHVIQYVNPFAFERMMGYHKGELLGK ELADLPKSDKNRADLLDTINTCIKKGKEWQGVYARRKSGDSI QQHVKITPVIGQGGKIRHFVSLKKLCCTTDNNKQIHKIHRDSG DNSQTEPHSFRYKNRRKESIDVKSISSRGSDAPSLQNNRRYPSM ARIHSMTIEAPITKVINIINAAQENS PVTVAEALDRVLEILRT TELYSPQLGTDKDEDPHTSDLVGGLMTDGLRRLSGNEYVFTKNV HQSHSHLAMPITINDVPPCISQLLDNEESWDFNIFELEAITHK RPLVYLGLKVFSRFGVCEFLNCSETTLRAWFQVIEANYHSSNA YHNSTHAADVLHATAFFLGKERVKGSLDQLDEVAALIAATVHD VDHPGRNTSFL\CNAGSELAVLYNDT\AV\LESHHTALAFQ\L TVKDTK\CNIFKNID/RGNHYRTLQAIIDMVLATEMTKHFEH VNKFVNSINKPMAAEIEGSDCECNPAGKNFPENQILIKRMMIK CADVANPCRPLDLCIEWAGRISEEYFAQTDEEKROGLPVVMPV FDRNTCSIPKSQISFIDYFITDMFDAWDAFAHLPALMQHLADN YKHWKTLDDLKCKSLRLPSDRLKPSHRGGLLTDKGHCESQ

SEQ ID NO: of Nucleic Acids	SEQ ID NO: of Amino Acids	Predicted beginning nucleotide location corre- sponding to first amino acid residue of amino acid sequence	Predicted end nucleotide location corre- sponding to first amino acid residue of amino acid sequence	Amino acid segment containing signal peptide (A=Alanine, C=Cysteine, D=Aspartic Acid, E= Glutamic Acid, F=Phenylalanine, G=Glycine, H=Histidine, I=Isoleucine, K=Lysine, L=Leucine, M=Methionine, N=Asparagine, P=Proline, Q=Glutamine, R=Arginine, S=Serine, T=Threonine, V=Valine, W=Tryptophan, Y=Tyrosine, X=Unknown, *=Stop Codon, /=possible nucleotide deletion, \=possible nucleotide insertion)
378	1117	1	3585	<p>AFLSKVEEDDYPSEELLEDEDENAINAKRSKEKNPGNQGRQFDVN  LQVPDRAVLGTIHPDPEIEESKQETSMILDSEKTSETAAKGVN  TGGREPNTMVEKERPLADKKAQRPFERSDFSISIKIQTPELGE  VFQNKDSYDLKNDNPPEHLKTSGLAGEPEGELSKEHDENTKEY  MGTESQGSAAAEPEDDSFHWTPHTSVEPGHSDKREDLLIISF  FKEQQSLQRFQKYFNVHELEALLQEMSSKLLKSAQQUESLPYNME  KVLDKVFRASESQILSIAEKMLDTRVAENRDLGMNENNI FEEA  AVLDDIQDLIYFVRYKHSTAEETATLVMAPPLEEGLGGAMEEM  QPLHEDNFSREKTAELNVQVPEEPHLDQRVIGDTHASEVSQK  PNTEKDLDPGPVTTEDTPMDAIDANKQPETA AEEPASVTPLEN  AILLIYSEMFYLT KSLVATLPDDVQPGPDFYGLPWKPVFITAF  LGIASF AIFLWRTVLVVKDRVYQVTEQQI SEKLKTIMKENTEL  VQKLSNYEQKIKESKKHVQETRKQNMILSDEAIKYKDKIKTLE  KNQEILDDTAKNLRVMLESEREQNVKNQDLISENKK SIEKLKD  VISMNASEFSEVQIALNEAKLSEKVKSECHRVQEENARLKKK  KEQLQQEIEDWSKLHAELSEQIKSFEKSQKDLEVALTHKDDNI  NALTNCITQLNLLECESESESGQNKGGNDSDELANGEVGGDRNE  KMKNQIKQMMDVSRQTQT AISVVEEDLKLQLKL \RASVSTKC\  NLEDQVKKLEDDRNSLQAAKAGLEDECKTLRQKVEILNELYQQ  KEMALQKKLSQEYERQEREHRLSAADEKAVSAAEEVKTYKRR  IEEMEDELQKTERS FKNQIATHEKKAHENWLKARAAERAIAEE  KREANLRHKLKLDLTQKMAMLQEEPVI V KPM PGKPNTQNP RR  GPLSQNGSFGPSVSGGECSPPLTVEPPVRPLSATLNRRDMPR  SEFGSLDGPLPHPRWSAEASGKPS PSDPGSGTATMNNSSRG S  SPTRVLDEGKVMAPKGPPPFPGVPLMSTPMGGVPVPPPIRYGP  PPQLCGPFGPRPLPPPFPGMRPPLGLREFAPGVPPGRDLPL  HPRGFLPGHAPFRPLGSLGPREYFIPGTRLPPTHTGPPQ EYPPP  PAVRDLLPSGSRDEPPPASQSTSQDCSQALKQSP</p>

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379	1118	3	2946	MAADSEPESEVFETITDFTTASEWERFISKVEEVLNDWKLIGNS LGKPLEKGIFTSGTWEEKSDEISFADFKFSVTHHYLVQESTDK EGKDELLEDVVPQSMQDLLGMNNDFFPPRAHCLVRWYGLREFVV IAPAAHSDAVLSESKCNLLSSVSIALGNTGCQVPLFVQIHHK WRRMYVGECQGPVVRTDFEMVHLRKVPNQYTHLSGLLDIFKSK IGCPLTPLPPVSIARFTYVLQDWQQYFWPQQPDDIDLVGGE VGGLEFGKLPFGACEDPISELHLATTW\PHLTEGIIVDNDVYS DLDP IQAPHWSVRVKAENPQCLLGDFVTEFFKICRRKESTDE ILGRSAFEEEGKETADITHALSKLTEPASVPIHKLSVSNMVHT AKKKIRKHRGVEESPLNNDVLNTILLFLPDAVSEKPLDGTTS TDNNNPPSESEDYNLYNQFKSAPSDSLTYKLALCLCMINFYHG GLKGVAHLWQEFVLEMRFRWENNFLIPGLASGPPDLRCCLLHQ KLQMLNCCIERKKARDEGKKTASDVTNIYPGDAGKAGDQLVP DNLKETDKEKGEVGSWDSWSDSEEEFFECLSDTEELKGNQGE SGKKGGPKEMANLRPEGRLYQHGLTLLHNGEPLYIPVTQEP PMTEDLLEEQSEVLAKLGTSAEGAHLRARMQSACLLSDMESFK AANPGCSLEDFVRWYSPRDYIEEEVIDEKGNNVLKGELSARMK IPSNMWVEAWETAKPIPARRQRRFLDDTREAEKVLHYLAIQKP ADLARHLLPCVIHA AVLKVKEEESLENISSVKKI IQTI SHSS KVLHFPNPEDKLEEIIHQITNVEALIRARSLKAKFGTEKCE QEEEEKEDLERFVSCLEQPEVLVTGAGRGHAGRIIHKLFVNAQ RAAAMTPPEEELKRMGSPPEERRQNSVSDFPFPPAGREFILRTTV PRPAPYSKALPORMYSVLTKEDFRLAGAFSSDTSFF
380	1119	2333	670	SPTRTGDRSVSLIVFLTEGKPTVGETHTLKI LNNTREARGOV CIFTIGIGNDVDFRLLEKLSLENCGLTRRVHEEEDAGSQLIGF YDEIRTPLLSDIRIDYPPSSVVQATKTLFPNYFNGSEII IAGK LVDRKLDHLHVEVTASNSKKFIILKTDVPRPQKAGKDVTGSP RPGGDGEDTNHIERLWSYLTTKELLSSWLQSDDEPEKERLRQ RAQALAVSYRFLTPFTSMKLRGPVPRMDGLEEAHGMSAAMGPE PVVQSVRGAGTQPGPILLKKPYQPRIKISKTSVDGDPHFVVDFF LSRLTVCFNIDGQPGDILRLVSDHRDSGVTVNGELIGAPAPPN GHKKQRTYLRITITILINKPERSYLEITPSRVILDGGDRLVLPC NQSVVVGSGGLEVSANANVTVTIQGSI AFVILHLYKKPAP FORHHLGFYIANSEGLSSNCHGLLGQFLNQDARLTEDPAGPSQ NLTHPLLLQVGEGPEAVLTVKGHVVPVWKQRKIYNGEEQIDC WFARNNAKLIDGEYKDYLASHPFDGTGMTLGQGMREL
381	1120	102	426	VPLESLSCHADNWKQELTKFISPDQLPVEFGTMTDPDGNPK CLTKINYGGEVPKSYLLCKQVRLQYEHTRSVGRGSSLQVENEI LFPGCVLRCPVELQHLQPGSF

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382	1121	3	3726	<p>PAAPEHTDPSEPRGSVSCCSLLRGLSSGWSSPLLPAAPVCNPNK  AIFTVDAKTTEILVANDKACGLLGYSSQDLIGQKLTQFFLRSD  SDVVEALSEEHEADGHAADVFGTVVDIISRSGEKIPVSVWMK  RMRQERRLCCVVVLEPVERVSTWVAFQSDGTVTSCDSLFAHLH  GYVSGEDVAGQHITDLIPSVQLPPSGQHIPKNLKIQRSVGRAR  DGTTFPLSLKLKSPSSEEATTGEAAPVSGYRASVWVFCTISG  LITLLPDGTIHINGINHSFALTFLGYGKTELLGKNITFLIPGFYS  YMDLAYNSSLQLPDLASCLDVGNESGCGERTLDPWQGDPAEG  GQDPRINVVLAGGHVVRDEIRKLMEQDIFTGTQTELIAGGQ  LLSCLSPQPAPGVNDVPEGSLPVHGEQALPKDQQITALGREEP  VAIESPGQDLLGESRSEPVDVKPFASCEDSEAPVPAEDGGSDA  GMCGLCQKAQLERMGVSGPSGSDLWAGAAVAKPQAKGQLAGGS  LLMHCPCYGESEWGLWWSQDLAPSPSGMAGLSFGTPTLDEPWL  GVENDREELQTCLIKEQLSQLSLAGALDVPHAEVLPTECQAVT  APVSSCDLGGRDLCGGCTGSSSACYALATDLPGGLEAVEAQEV  DVNSFSWNLKELFFSDQTDQTSNCSCATSELRETPSSLAVGS  DPDVGSLQEQQSCVLDRELLLLTGTCVDLQGRRFRESCVGH  DPTEPLEVCLVSSEHYAASDRESPGHVPSTLDAGPEDTCPSAE  EPRLNVQVTSTPVI VMRGAAGLQREIQEGAYSGSCYHRDGLRL  SIQFEVRRVELQGPTPLFCCWLKDLLHSQRDSAARTLFLAS  LPGSTHSTAELTGPSLVEVLRARPWFEEPPKAVELEGLAACE  GEYSQKYSTMSPLGSGAFGFVWTAVDKEKNKEVVVKFIKKEKV  LEDWCIEDPKLGKVTLEIATLSRVEHANI KVLDIFENQGFQ  LVMEKHGSGLDLFAFIDRHPRLDEPLASYIFRQVRAG\QSRV  SAVGYLRLKDI IHRDIKDENVIAEDFTIKLIDFGSAAYLERG  KLFYTFCGTIEYCAPEVLMGNPYRGPELEMWSLGVTLTYLVFE  ENPFCELEETVEAAIHPPYLVSKELMSLVSGLLQPVPERRTTL  EKLVTDPWVTQPVNLADYTWEVFRVKNKPESGVLASAASLEMGN  RSLSDVAQAQELCGGPVPGEAPNGQGCLHPGDPRLITS</p>
383	1122	177	1365	<p>PGTSAATCRFLSPPVISLSFTGLCISDLVAVNGVWILVETFM  LKGGNFFSKHVPWSYLVLFTIYGVELFLKVAGLGPVEYLSSGW  NLFDFSVTVFALGLLALALNMEPFYFIVLRLQLLRLFLKLK  ERYRNVLDTMFELLPRMASLGLTLLIFYYSFAIVGMEFFCGIV  FPNCCNTSTVADAYRWRNHTVGNRTVVEEGYYLNNFDNILNS  FVTLFELTVNNWYI IMEGVTSQTSHWSRLYFMTFYIVTMVVM  TIIVAFILEAFVFRMNYSRKNQDSEVDGGITLKEISKEELVA  VLELYREARGASSDVTRLLETLSQMERYQQHSMVFLGRRSRTK  SDLCLKMYQEERIQEWYEEHAREQEQQRQLSSSAAPAAQPPGS  RQRSQTVT</p>

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384	1123	1	986	LAGVGTQAPRRPGGEMAAGQNGHEEWVGSAYLFVLESSLDKVV LSDAYAHPPQKVAVYRALQAALAESGGSPDVLQMLKIHRSDFQ LIVQLRFQGRQPCGRFLRAYREGALRAALQRLAALAQHSVP LQL\DLRAGAERLEALLADEERCLSCILAQQPDRLRDEELAE EDALRNLCGSGARGGDGEVASAPLQPPVPSLSEVKPPPPPP AQTFLLFQGPVVRPLSLKDDQTFARSVGLKWRKVGRLQRC RALRDPALDSLAYEYEREGLYEQAFQLLRRFVQAEGRATLQR LVEALEENELTSLAEDLLGLTDPNGGLA
385	1124	2409	399	SSKPKLKKRFLRSVGRSVRGSVRGILQWRGTVPDPSSAGPLE TSSGPPVLGGNSNSNSGGAGTVGRGLVSDGTSPPERWTHRFE RLRLSRGGGALKDAGMVQREELLSFMGAEEAAPDPAGVGRGG GVAGPPSGGGGQPPQWQKCRLLLRSEGGGGSRLEFFVPPKAS RPRLSIPCSSITDVRTTTALEMPDRENTFVVKVEGPSEYIMET VDAQHVKAWSIDIQECLSPGPCPATSPRMTLPLAPGTSFLTR ENTDSLELSCLNHSESLPSQDLLLGPSESNDRLSQGAYGGLSD RPSASISPSSASIAASHFDSMELLPPPELPPRIPIEEGPPAGTV HPLSAPYPPLDTPETATGSFLFQG\EPEGGEQDQPLSGYPWFH GMLSRLKAAQLVLTGGTGS SHGVFLVRQSETRRGEYVLTNFGQ KAKHLRLSLNEEGQCRVQHLWFQSFDMLEHFRVHPIPLESGG SSDVVLVSYPSSQRQGEQSR SAGEEVPVHPRSEAGSRLGAM RG CAREMDATPNASCTLMPPFGASDC\EPTTSHDPPQPPEPPSW TDPPOPGEE\EASR\APGSGGQAAAAAKERQEKEKAGG\GGV PEE\LVPVVLVPVGEGLGEGHRPQAQEAQRLGPGGDAGVPP\ MVQLQQSPLGG\DGEEGGHPR\AI\NNQYSFV
386	1125	2204	1042	FRAPVGTAARSPQVVIRRLPPLTKEQLEEQRLPLPAHDYFEF FAADLSLYPHLYSRAYINFRNPDDILLFRDRFDGYIFLDSKDP EYKKFLETYCVEEKTSANPETLLGEMEAKTRELIARRTTPLL EYIKNRKLEKQRIREEKREERRRRELEKKRLREEKRRRREEE RCKKKETDKQKKIAEKEVRIKLLKKPEKGEEPTTEKPKERGE IDTGGGKQESCAPGAVVKARPMEGSLEEPQETSHSGSDKEHRD VERSQEQESEAQRVHVDGRRHRAHHEPERLSRSEDEQRWGK GPGQDRGKKGSGDSGAPGEAMERLGRAQRCDSPAPRKERLAN KDRPALQLYDPGARFRARECGGNRRICKAEGSGTGPEKREEAE
387	1126	176	800	GVWGVCSGLLOVGSQRAQAWRAWSPMETPLTGTGTLWPHIPQG LFFDDSYGFYPGQVLIGPAKIFSSVQWLSGVKPVLSKSKFRV VVEEVQVVELKVTWITKSFPCGGTDSVSPP/PSVITQENLGRV KRLGCFDHAQR/HAWGALSVCLPSQGRASQDCLGMSRKKLRPG GGLYGQEGEAPVEEAGCADHVMLPRHPVFPFGPFHGRPR

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388	1127	1	2017	FRDSSPCSAFEHCLSGECIHSSWRCDGGPDCKDKSDEENCAV ATCRPDEFQCSGNCIHGSRQCDREYDCKDMSDEVCVNVTL EGPNKFKCHSGECITLDKVCNMARDCRDWSDEPIKECGTNECL DNNGGCSHVNDLKGVECLCPDGFQLVAQRRCEDIDECQDPD TCSQLCVNLEGGYKCCQEEGFQLDPHTKACKAVGSIAYLFFTN RHEVRKMTLDRSEYTSILPNLRNVVALDTEVASNRIYWSDL RMICSTQLDRAHGVSSYDTVISRDIQAPDGLAVDWIHSNIYWT DSVLGTVSVADTKGVKRTLFRENGSKPRAIVDPVHGFMYWT DWGTPAKIKKGGNGVDIYSLVTENIQWPNGITLDDLSSGRLYW VDSKLHSSISSIDVNGGNRKTILEDEKRLAHPFSLAVFEDKVF TDIINEAIFSANRLTGSDVNLLAENLLSPEDMVLFHNLTQPRG VNWERTTSLNGGCQYLCLPAPQINPHSPKFTCACPDGMLLAR DMRSCLETEG\EA AVATQETSTVRLKVSSTAVRTQHTTTRPVPD TSRLPGATPGLTTVEIVTMSHQALGDVAG\RGN\EKKPSSVRA LSIVLPPIV\LLVFLCLGVFLLWKNWRLKNINSINFDPVYQKT TEDEVHICHNQDGYSPSRQMVSLDDVA
389	1128	2299	1148	RIPGLGPPGSPPPPHVRGMPGCPGCGMAGPRLFLTLAL ELLGRAGGSQPALRSRGATACRLDNKESESWGALLSGERLDT WICSLILGSLMVGLSGVFPLLVIPLEMGTMRLSEAGAWRLKQL SFALGGLLGNVFLHLLPEAWAYTCSASPGGEGQSLQQQQQLGL WVIAGILTFLALEKMFLDSKEEGTSQAPNKDPTAAAAALNGGH CLAQPAEPGLGAVVRSIKVSGYLNLLANTIDNFTHGLAVAAS FLVSKKIGLLTTMAILLHEIPHEVGDFAILLRAGFDRWSAAKL QLSTALGGLLAGFAICTQSPKGVEETAAWVLPFTSGGFLYIA LVNVLPDLLLEEDPWRSLQQLLLLCAGIVVMVLFSLFVD
390	1129	1	523	GKVSAGQAGADRTLRRAPRFRSQEPTGNSAYPQLRPFDPQG RDLKPSALVPPTRSHTGRRPWLHTQPLPGPQGRAWGPTC/TPA CVDRLVLESEGRREYLAFPTSKSSGQKGRKELLKGNRRIDYM LHAEGLCPDWKAEEVEFSFITQLSGLTDHLPVAMRLMVSSGE EEA
391	1130	1459	765	PCGGIRLSASEAATLFGYLVVPAGGGGTFLGGFFVNKLRLRGS AVIKFCLFCTVVSLLGILVFLHCPSPVMAGVTASYGGSLLPE GHLNLTAPCNAACSCQPEHYSPVCGSDGLMYFSLCHAGCPAAT ETNVDGQKVSGAAAYRPCPPLDPGKGPCLPLVIGAIVGLPRC TETVAVSLRIFPLVLAM\HCREMHFNLSKAPPSGFHIRCNFL YIPQQHSCCTNGNSTMCP
392	1131	1668	962	LLRKVGAPGGARGVIRLLDWFERPDGFLVLRLERPEPA\QD\LF DFITERGALDEPLARRF\FAQVLA AVRHCHSCGVVHRDIKDEN LLVDLRSGELKLIDFGSGALLKDTVYTFDGT RVYSPPEWIRY HRYHGRSATVWSLGVLLYDMVCGDIPFEQDEEILRGRLFRRR VSPECQQLIRWCLSLRPSERPSLDQIAAHPWMLGADGGAPESC DLRLCTLDPDDVASTTSSESL

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393	1132	3	817	GKNSQKASPVDDQLSVCLSGFLDEVMMKKYGSIVPLSEKEVLG RLKDVFNEDFSNRKPFINREITNYRARHQCENFRIFYNKHM MDDLATLDGQNLNDQVINMYGELIMDAVPDKVHFFNSFFHRQ LVTKGYNGVKRWTKKVDLFKKSLLLIPIHLEVHWSLITVTLN RIISFYDSQGIHFKFCVENIRKYLLEAREKNR\NLNQGWQTA VTKCIPQQKNDSDCGVFLVLYCKCLAL\KQPFQSQEDMPRVR KRIYKELCECRIMD
394	1133	1252	628	PPGG*QGSAAKHR/FP/KGYRHPALEARLGRRTVQEARALLR CRRAGISAPVVFVDYASNCLYMEEIEGSVTVRDYIQSTMETE K\TPQGLSNLAKTIGQVLARMHDEDLIHGDLTTSNMLLKPPLE QLNIVLIDFGLSFISALPEDKGVLDLYVLEKAFSLTHPNTETVF EAFKLSYSTSSKKARPVLKKLDEVRLRGKKRSMVG
395	1134	2	1595	RACVFRPEDMMQGEAHPASALIDRTIKMRKETEARKVVLAWGL LNVSMAGMIYTEMGKLISYYNVTYWPLWYIELALASLFSLN ALFDFWRYFKYTVAPTSLVVSPGQQTLLGLKTAVVQTTTPHDL AATQIPAPPSPSIQGSVLSYSPSRSPSTSPKFTTSCMTGYS PQLQGLSSGSGSYSPGVTVSPVSGYNKLASFSPSPSPYPTT VGPVLESSGLRSRYRSSPTVYNSPTDKEDYMTDLRLDTFLRSE EEKQHRVKLGSPDSTSPSSSPTFWNYSRSMGDYATLKKFQYQ LACRSQAPCANKDEADLSSKQAAEEVWARVAMNRQLLDHMSW TAKFRNWINETILVPLVQEIESTVSTQMRMGCPQLQIGEASIT SLKQAALVKAPLIPTLNTIVQYLDLTPNQEYLFERIKELSQQG CMSSFRWNRRGGDFKGRKWDTLPTDSAIIMHVFCYLDLSRLPP HPKYPDGKTFTSQHFVQTPNKPVDVTNENVFCIYQSAINPPHYE LIYQRHVYIPAKGQK
396	1135	16	1542	SSAVEFINRNNSVVQVLLAAGADPNLGDDFSSVYKTAKEQGIH SLEVLITREDDFNNRLNRRASFKGCTALHYAVLADDYRTVKEL LDGGANPLQRNEMGHTPLDYAREGEVMKLLRTSEAKYQEKQK REAEERRRFPLEQRLKEHIIQESAIATVGAAIRKENGWYDE EHPLVFLFLGSSGIGKTELAKQTAKYMHKDAKKGFIRLDMSEF QERHEVAKFIGSPPGYVGHEEGGQLTKKLKQCPNAVVLDFEVD KAHPDVLTIMLQLFDEGRITDGKGKTIDCKDAIFIMTSNVASD EIAQHALQLRQEALEMSRNRIENLGDVQISDKITISKNFEN VIRPILKAHFRDEFGRINEIVYFLPFCHSELIQLVNKELNF WAKRAKQRHNITLLWDREVADVLVDGYNVHYGARSIKHEVERR VGNQLAAAYEQDLLP\GGCTLRITVEDSDKQLKSPPELSPQA EKRLPKLRLEIIDKDSKTRRLDIRAPLHPEKVCNTI
397	1136	1848	1602	SSCDRERHGSGLGMMSGSFILCLALVTRWSPQASSVPLAVYESK TRKSYRSQRDRDGKDRSQGMGLSLLVETRKLKLLSANQG



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398	1137	1497	717	HTPMA/FFL/SFLSTSET/VYTFVILPKMLINLLSVARTISFN CCALQMFFFLGFAITNCLLLGVMGYDRYAAICHPLHYPTLMSW QVCGKLAACAIGGFLASLTVVNLVFSLPFCSTNKVNHYFCDI SAVILLACTNTDVGNGFVIFICGVLVLVVPFLFICVSYFCILRT ILKIPSAEGRRKAFSTCASHLSVVIVHYGCASFIIYLRPTANYV SNKDRLVTVTYTIVTPLLNPVYSLRNKDVQLAIRKVLGKKGS LKLYN
399	1138	2	1185	RPPAATRYPREKLKSMTSRDNYKAGSREAA\AAAAA\AAAAA AAAAAEPYPVSGAKRKYLEDSDPERSDYEEQQQLQEEEEARKVK SGIRQMRLFSQDECAKIEARIDEVVSRAEKGLYNEHTVDRAPL RNKYFFGEGYTYGAQLQKRGPGQERLYPPGDVDEIPEWVHQLV IQKLVEHRVPIPEGFVNSAVINDYQPGGCIVSHVDPIHIFERPI VSVSFFSDSALCFGCKFQFKPIRVSEPVLSLPVRRGSVTVLSG YAADEITHCIRPQDIKERRAVIILRKTRLDAPRLETKSLSSSV LPPSYASDRLSGNNRDPALKPKRSHRKADPDAAHRPRILEMDK EENRRSVLLPTHRREGSFSENYWRKSYESSEDCSEAAGSPAR KVKMRRH
400	1139	60	1699	VTWHFYFCSDHKNGHYIIPQMAADRSRQKCMSQSLDLSELAKAA KKKLQALSNRLFEEELAMDVYDEVDRRENDVWLATQNHSTLVT ERSAVPFLPVNPEYSATRNQGRQKLARFNAREFATLIIDILSE AKRRQQGKSLSSPTDNLELSLSQSDLDDQHDYDSVASDEDTD QEPLRSTGATRSNRARSMDSSDLSGAVT\LQEYLELKALAT SEAKVQQLMKVNSSLSD\RLQREHFAP\IHKLQAE NLQ RQPPGPVPTPLPSERAHTPMAPGGSTHRRDRQAFSMYEPGS ALKPFGGPPGDEL'TRLQPFHSTELEDDAIYSVHVPAGLYRIR KGVASAVPFTPSPLSCSQEGSRHTSKLSRHGSGADSDYEN TQSGDPLLGLEGKRFLELGKEEDFHPELES LDGDLDPGLPSTE DVILKTEQVTKNIQELLRAAQEFKHDSFVPCSEKIH LAVTEMA SLFPKRPALPVRSSRLNANASAYRLQSECRKTVPPPEPGAPVD FQLLTQQVIQ CAYDIAKAAKQLVTITTREKKQ

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401	1140	1	1863	RYLSYSGSGPKRFPLVDVLQYALEFASSKPVCTSPVDDIDASSP PSGSIPSQTLPTSTTEQQGALSSELPTSPSSVAAISSRSVIHK PFTQSRIPDPLMHPAPRHITTEELSULESCLHRWRTEIENDT RDLQESISRIHRTIELMYSDKSMIQVPYRLHAVLVHEGQANAG HYWAYIFDHRSESRWMKYNDIAVTKSSWEELVRDSFGGYRNASA YCLMYINDKAQFLIQEEFN/K/ETGQPLVGIETLPPDLRDFVE EDNQRFEKELEEWDAQLAQKALQEKLLASQKLRESETSVTTAQ AAGDPKYLEQPSRSDFSKHLKEETIQIITKASHEHEDKSPETV LQSAIKLEYARLVKLAQEDTPPETDYRLHHVVVFYIQNQAPKK IIEKTLLEQFGDRNLSFDERCHNIMKVAQAKLEMIKPEEVNLE EYEEWHQDYRKFRETTMYLITIGLENFQRESYIDSLLFLICAYQ NNKELLSKGLYRGHDEELISHYRRECLLKLNEQAELFESGED REVNNGLIIMNEFIVPFLPLLLVDEMEEEKDILAVEDMRNRWCS YLGQEMEPHLQEKLTDFLPKLLDCSMEIKSFHEPPKLPSTH ELCERFARIMLSLSRTPADGR
402	1141	1	465	AQVYVRMDSFDEDLARPSGLLAQERKLCRDLVHSNKKEQEFRS IFQHIQSAQSQRSPSELFAQHM\VPVHHVKEHHFGSSGMTLH ERFT\KYLKRG\TEQEAANKKSPEIHRRIDISPSTFRKHGLA HDEMKSPPREPGYKDGHNKSKNELQRVNFY
403	1142	2	369	TYTFCFSLMI\ILLTIIQGLILEAFGEIRDQDQVKEDMETKC FICGIGNDYFDTPVPHGFETHLTQEHNLANYLFFFLMYLINKDET EHTGQESYVWKMYQERCWEFFPAGDCFRKQYEDQLN
404	1143	3115	557	FRKGGGGPKDFGAGLKYNSRHEKVNGLGEEGVFLPVNNVKKV EKHGPRWVLLAVALIGLLLVLLGIGFLVWHLQYRDVVRQKVF NGYMRITNENFVDAYENSNSTEFVSLASKVKDALKLLYSGVFP LGPYHKESAVTAFSEGSVIAYWSEFSIPQHLVEEAERVMABE RVVMLPFRARSLKSFVVTSVVAFPTDSKTVQRTQDNCSFGLH ARGVELMRFTTPGFPDSPYPAHARCQWALRGDADSVLSLTFRS FDLASCDEGRHLV\TVYNT\LSPMEPHA\LVQLCGTYPPSYN LTFHS\S\QNVLLITLITNTERRHPG\FEATFFQLPRMSSCGG RLRKAQGTFNSPYYPGHYPNIDCTWNIEVPNNQHVKVRKFF YLLEPGVPAGTCPKDYVEINGEKYCGERSQFVVTSSNKNITVR FHSDQSYTDTGFLAEYLSYDSSDPCPGQFTCRTGRCIRKELRC DGWADCTDHSDELNCSCDAGHQFTCKNKFKPLFWVCDLSLND GDNSDEQGCSCP\AQTFRCNSNGKCLSKSQCCNGKDDCGDGSDE ASCPKVNVTCTKHTYRCLNGLCLSKGNPECDGKEDCSDGSDE KDCDCGLRSFTRQARVVGTDADGEWQVSLHALGQGHICG ASLISPNWLVSAAHCYIDDRGFRYSDEPTQWTAFLGLHDQSQRS APGVQERRLKRIISHPPFNDFTFDYDIALLELEKPAEYSSMVR PICLPDASHVFPAGKAIWVTGWGHTQYGGTGALILQKEIRVI NQTTCECNLLPQQITPRMCMCVGFLSGGVDSCQDGGGPLSSVEA DGRIFQAGVVSWGDGCAQRNKGVYTRLPFLFRDWIKENTGV

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405	1144	1	424	RHEEDLGNLWENTRFTDCSFFVRGQEFKAHKSFLAARSFVFNA MFEHEMESKKNRVEINDLDPEVFKEMMRFIYTGRAPNLDKMA DNLLAAADKYALERLKMCEKALCSNLSVENVADTLVLADLHS AEQLKAQAIDFINRCSVLRLGCKDGKNWNSNQATDIMETSG GKSMIQSHPHLVAEAFRALASAQGPQFGIPRKRLQS*NLGNL WENTRFTDCSFFVRGQEFKAHKSFLAARSFVFNAMFEHEMES KKNRVEINDLDPEVFKEMMRFIYTGRAPNLDKMAADNLLAAADK YALERLKMCEKALCSNLSVENVADTLVLADLHSGRTVESTSH RLY
406	1145	1	1021	QRGGIPGKFQEDSGSVDWALGPFWGI FQADFGCMRFYLSAQT DPVLRM*WGSPSPISHPTSLCPGGGAGQTTGSLCLGQQCCPLS CPNIPSRHKRWRL*AALVAGSRGSCITLRS*R*RTPLPVTNRNL R/CHLHLHPTGDLRVHVGHCLLHGHVPPGAALLQCGGCDLRG EAAGLLFLGHACLRGSVNLRDQWLPV\PYSRLCFSGAREGHL PSLLAMIHVRHCTPIPALLC\PIKVNLLIPVAYLVFWAFLLV FSFISEHMCVGVGVI IILTGVPIFFLGVFWRSKPKCVHRLTES MTHWGQELCFVVPQDAPEEEENGPCPPSLLPATDKPSKPQ
407	1146	2	1280	AAALVAEYLALLEDRHLPVGCVSFQNISSNVLEESAISDDIL SPDEEGFCSGKHFTLGLVGLLEQAAGYFTMGGLYEAVNEVYK NLIPILEAHRDYKLAHVHGLQEAFTKIMHQS SGWERVFGTY FRVGFYGAHFGDLDEQEFVYKEPSITKLAEISHRLEEFYTERF GDDVVEIIKDSNPVDKSKLDSQKAYIQITYVEPYFDTYELKDR VTYFDRNYGLRTFLFCTPFTPDGRAHGELEQHKRKTLLSTDH AFPIKTRIRVCHREETVLTP\VEVAIEDMQKKTRELAFATEQ DPPDAKMLQMVLGSGVPTVNGQPLEVAQVFLAEIPEDPKLFR HNNKLRLCFKDF\*KKCEDALRKNKALIGPDQKEYHRELERNY CRLREALQPLLTQRLPQLMAPTPPGLRNSLNRSFRKADL
408	1147	55	651	GEGQQWQSTPLSPLQPTVADFLNLAWWTSAAAW*VLSGRWVEK VLPREGSEEK*GMASSADHLHSAPRALQ\SLFQQLLYGLIY HSWFQAGR*GFGGASSSPGPQSELRLHGEQGVYD*GRPETLP GSVGGAEALWALADPAEAGSPETRESSCVMKQTQYYFGSVNA SYNAI IDCNCRCWQWGGTRGQGRNL
409	1148	1855	904	VAGIPACFDN/FTEALAEACRQMGYSSKPTFRAVEIGPDQDL DVVEITENSQELMRNSSGPCLSGSLVSLHCLACGESLKTFRV VGGEASVDSWPWQVSIQYDKQHVCGGSILDPHWVLTAAHCFR KHTDVFNWVKRAGSDKLGSPSLAVAKIIIIIEFNPMYPKDNDI ALMKLQFPLTFSGTVRPICLPFFDEELTPATPLWIIIGWFTKQ NGGKMSDILLQASVQVIDSTRCNADDAYQGEVTEKMMCAGIPE GGVDTCQGDSSGPLYQSDQWHVVGIVSWGVCGGPSTPGVYT KVSAYLNWIYNVWKAEL

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410	1149	3	964	TISTVRWNSRIGMVLGVAIQKRAV\PGLY\AFEEAYARADKEA PRPCHKGSWCSSNQLCRECQAFMAHTMPKLFKAFSSAYNAYR AVYAVAHGLHQLLGACSGACSRGRVYPWQLLEQIHKVHFLHLK DTVAFNDNRDPLSSYNIIAWDWNQPKWTFVTVLGSSSTWSPVQLN INETKIQWHGKDNQVPKSVCSDDCLEGHQVRVTGFHHCCFECV PCGAGTFLNKS/SYLGKDLPENYNEAKCVTFSLLFNFVSWIAF FTTASVYDGKYLPAANMMAGLSSLSSGFGGYFLPKCYVILCRP DLNSTEHFQASIQDYTRRCGST
411	1150	2	1378	VARGAFHPKMGPSFFSPKPGSERLSFVSAKQSTGQDTEAELQD ATLALHGLTVEDEGNYTCEFATFPKGSVRGMTWLRVIAKPKNQ AEAQKVTFSDPTTVALCISKEGRPPARISWLSSLDWEAKETQ VSGTLAGTVTVTSRFTLVPSGRADGVTVTCKVEHESFEPEALI PVTLSVRYPPEVSISGYDDNWYLGRTDATLSCDVRSNPEPTGY DWSTTSGTFPTSASVAQGSQVLVIHAVDSLNTTFVCTVTNAVGM GRAEQVIFVRETPNTAGAGATGGIIGGIIAAIIATADA\TGIL ICRQQRKEQTLQGAEDEDLEGPSPSYKPPTPKAKLEAQEMPSQ LFTLGASEHSPKTPYFDAGASCTEQEMPRYHELPTLEERSGP LHPGATSLGSPIPVPPGPPAVEDVSLDLEDEEGEEEEYYLDKI NPIYDALSYSSPSDSYQKGFMVSRAMYV
412	1151	1	1828	GTRLREDKNHNMVYVAGCTEVEVKSTEEAFVFWRGQKKRRIAN THLNRESSRSHSVFNKLVQAPLDADGDNVLQEKEQITISQLS LVDLAGSERTNRTAEGRNRLREAGNINQSLMTLRTCMDVLREN QMYGTNKMVPYRDSKLTHLFKNYFDGEGKVRMIVCVNPKAEDY EENLQVMRFAEVTQEVEVARPVDKAICGLTPGRRYRNQPRGP\ IGNEPLVTDVVLQSFPPPLPSCEILDINDEQTLPRLEALEKRH NLRQMMIDEFNKQSNAPKALLQEFDAVLNLSKENHMQGKLNEKE KMISGQKLEIERLEKKNTLEYKIEILEKTTTIYEEDKRNLOQ ELETQNQKLQRFSDKRRLEARLQGMVTETTMKEKECERRVA AKQLEMQNKLWVKDEKLKQLKAIVTEPKTEKPERPSRERDREK VTQRSVSPSPVPLLFQPDONAPPILRHRRSRASAGDRWVDHKP ASNMQTETVMQPHVPHAITVSVANEKALAKCEKYLTHQELAS DGEIETKLIKGDYKTRGGGQSVQFTDIETLKQESPNGSRKRR SSTVAPAQPDGAESEWTDVETRCVAVEMRAGSQLGPGYQHHA QPKRKKP
413	1152	1	336	PFSSSSVSSKGSDFGTLDFFGSGSFNSAEGFADFQMS/KGK STPVSQGLSADFPEAPDPFQPLGADSGDPFQSKKGFDPFSGK DPFVPSSAAKPSKASASGFADFTSVS

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414	1153	1	1334	MSLMVVSMAVCGLFLVQRAGPHMGGQDKPFLSAWPSAVVPRGG HVTLRCHYRHRFNNFMYLKEDRIHIPIFHGRIFQESFNMSVPT TAHAGNYTCRGSHPHSPTGWSAPSNPVVIMVTGNHRKPSLLAH PGPLVKSGERVILQCWSDIMFEHFFLHKEGISKDPSRLVGQIH DGVSKANFSIGPMMQDLAGTYRCYGSVTHSPYQLSAPSDDLDI VITGLYEKPSLSAQPGPTVLAGEVTLSCSSRSYDMYHLSRE GEAHERRFSAGPKVNGTTFQADFPPLGPATHGGTYRCFGSFRDSP YEWSNSSDPLLVSVTGNPSNSWSPTEPSSSETGNPRHLHLVIG TSVVIILFILLFFLLHRWCSN\KKNAAVMDQESAGNRTANSE DSDEQDPQEVITYTQLNHCVFTRQKITRPSQRPKTPPTDIIVYT ELPNAESRSKVVSCP
415	1154	1	1570	MSLRVHTLPTLLGAVVRPGCRELLCLLMITVTVGPGASGVCPT ACICATDIVSCTNKNLSKVPGNLFRLIKRLDLSYNRIGLLDSE WIPVSFAKLNTLILRHNNITSISTGSFSTTPNLKCLDLSSNKL KT\VKNAVFQELKVLEVLLLYNNHISYLDPSAFGGLSQLQKLY LSGNFLTQFPMDLYVGRFKLAELMFLDVSYNRIPSMFMHHINL VPGKQLRGIYLGHNPFVCD\CSLVSLLVFWYRRHFSSVMDFKN DYTCRLWSDSRHSRQVLLQDSFMNCSDSIINGSFRALGFIHE AQVGERLMVHCDSKTGNANTDFIWVGPDNRLLLEPKEMENFYV FHNGSLVIESPRFEDAGVYSCIAMNKQRLNETVDVTINVSNF TVSRSHAHEAFNTAFTTLAACVASIVLVLLYLYLTPCPCKCKT KRQKNMLHQSNHSSILSPGPASDASADERKAGAGKRVVFLEP LKDTAAGQNGKVRLEPSEAVIAEGILKSTRGKSDSDSVNSVFS DTPFVAST
416	1155	2	1928	ASDFIRSLDHCGYLSLEGVFSHKPDEFELQDVSSVNEDVLLTTG LLCKYTAQRFKPKYKFFHKSFQEYTAGRRLSSLLTSHEPEEVT KNGYLGKQMVSI SDITSTYSSLLRYTCGSSVEATRAVMKHLAA VYQHGCLLGLSIAKRPLWRQESLQSVKNTTEQEILKAININSF VECGIHLQESTSKSALSQEFEAFFQGKSLYINSGNIPDYLEF FFEHLPCASALDFIKLGFYGGAMASWEKAAEDTGGIHMEEAP ETYIPSRVSLFFNWKQEFRTLEVTLRDFSKLNKQDIRYLGKI FSSATSLRLQIKRCAGVAGSLSLVLSTCKNIYSLMVEASPLTI EDERHITSVTNLKTL SIHDLQNQRLPGGLTDSLGNLKNLTCLI MDNIKMNEDAIKLAEGKLNKKMCLFHLTHLSDIGEGMDYIV KSLSSEPCDLEEIQLVSCCLSANAVKILAQNHLNLVKLSILDL SENYLEKDGNEALHELIDRMNVLEQLTALMLPWGCDVQGSLS LLKHLEEVQQLVKLGLKNWRLTDTEIRILGAFFGKNPLKNFQQ LNLAGNRVSSDGWLA FMGVFENLKQLVFFDFSTKEFLPDPA LV RKLSQVLSKLTFLQEARLVGWQFDDDDLSVITGAFKLVT
417	1156	342	718	ASDRKVAMTCDCFWFRMTLDQHASCMEVGTERERQAG\GLVMF DPGSGFPTGEKVLQDDEFTCDLFRFLQLLCEGHNSGL*VPGTSD DTKA*IMFSSQ*QEPVSSNYASF*RQQIILEHGSALGSG

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418	1157	1	135	EITHIVGETAAFLCPRRLRRGGKDGSPKPGFLASVIPVDRRP GE*DITHIVGETAAFLCPRRLRRGGKDGSPKPGFLASVIPVD RRPGE
419	1158	173	943	SKFIFYVDSQSMIFFFQTPTRHKVLIMEFCPCGSLYTVLEEPS NAYGLPESEFLIVLRDVVGGMNLHRENGIVHRDIKPGNIMRVI GEDGQSVYKLTDFGAARELEDDQFVSLYGTEEYLHPDMYERA VLRKDHQ\KKYGAT\VDLW\SIGVTTFYQGKPTGS\LAI*HPFE GASVRNKASDGIKIITGKGLLGAI\S\GVQKSKKNG\PI\DWEW EDMPVSCSPSSGVL RVPNLPPVLA\NILESRSRKKCWGF*PSF LQEN
420	1159	987	500	GSTISCERSLRSLWTAHWALPEMDSRIPYDDYPVVFPLPAYENP PAWIPPHERVHHPDYNNELTQFLPRTITLKKPPGAQLGFNIRG GKASQLGIFISKVIPDSDAHRAGLQEGDQVLAVNDVDFQDIEH SKAVEILKTAREISMRVRFFPYNVHRQKERTVH
421	1160	3	890	HEQVSALHRRRIKAIVEVAAMCGVNIICFQEAWTMPFAFCTREK LPWTEFAESAEDGPTTRFCQKLAKNHDMMVVSPILERDSEHGD VLWNTAVVISNSGAVLGKTRKNHIPRVGDFNESTYYMEGNLGH PVFQTQFGRIAVNICYGRHHPLNWL MYSINGAEIIFNPSATIG ALSESLWPIEARNAAIANHCFTCAINRVGTEHFPNEFTSGDGK KAHQDFGYFYGSSYVAAPDSSRTPGLSRSRDGLLVAKLDLNL CQQVNDVWNFKMTGRYEMYARELAEAVKSNYSPTIVKE

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422	1161	5214	352	MAKSGGCGAGAGVGGGNGALTWVNNAAKKEESETANKNDSSKK LSVERVYQKKTQLEHILLRPDTYIGSVEPLTQFMWVYDEDVGM NCREVTFVPGLYKIFDEILVNAADNKQRDKNMTCIKVSIDPES NIISIWNNGKGI PVVEHKVEKVYPALIFGQLLTSSNYDDEK KVTGGRNGYGAKLCNIFSTKFTVETACKKEYKHSFKQTWMNMM KTSEAKIKHFDGEDYTCITFQPDLSKFKMEKLDKDI VALMTRR AYDLAGSCRGVKVMFNGKKLPVNGFRSYVDLYVKDKLDETGVA LKVIHELANERWDVCLTLSEKGFQQISFVNSIATTKGGRHVDY VVDQVVGKLI EVVKKKNKAGVSVKPFQVKNHIWVF INCLIENP TFDSQTKENMTLQPKSFGSKCQLSEKFFKAASNCGIVESILNW VKFKAQTQLNKKCSSVKYSKIKGIPKLDDANDAGGKHSLECTL ILTEGDSAKSLAVSGLGVIGRDRYGVFPLRGKILNVREASHKQ IMENAEINNI IKIVGLQYKKS YDDAQSLKTLRYGKIMIMTDQD QDGSNIKGLLINFIIHNWPSLLKHGFLEEFITPIVKASKNKQE LSFYSIPEFDEWKKH IENQKAWKIKYYKGLGTSTAKEAKEYFA DMERHRILFRYAGPEDDAAITLAFSKKKIDDRKEWLTNFMEDR RQRLHGLPEQFLYGTATKHLTYNDFINKELILFSNSDNERSI PSLVDGFKPGQRKVLFTCFKRNDKREVKVAQLAGSVAEMSAYH HGEQALMMTIVNLAQNFVGSNNINLLQPIGQFGTRLHGGKDAA SPRYIFTMLSTLARLLFPAVDDNLLKFLYDDNQ RVEPEWYIPI IPMVLINGAEGIGTGWACKLPNYDAREIVMNVRRMLDGLDHPH MLPNYKNFKGTIQELGQNQYAVSGEIFVVDNRNTEITELPVRT WTQVYKEQVLEPMLNGTDKTPALISDYKEYHTD TT VKFVVKMT EEKLAQAEAAAGLHKVFKLQTTLTCSNMVLF DHMGCLKKYETVQ DILKEFFDLRLSYGLRKEWLVGMLGA EFTKLNNQARFILEKI QGKITI*NRSKDLIQMLVQRGYESDPVKAWKEAQEKAAEED TONQHDDSSSDSGTPSGPDFNYILNMSLWSLTKEKVEELIKQR DAKGREVNDLKRKSPSDLWKEDLAAFVEELDKVESQEREDVLA GMSGKAIKGVGKPKVKKLQLEETMPSPYGRRIIPEITAMKAD ASKKLLKKKKGDLDTAAVKVEFDEEFGAPVEGAGEEALTPSV PINKGPKPKREKKEPGTRVRKTPTSSGKPSAKVKVKNRPWSDD ESKSESDLEETEPVVI PRDSLLRRAAERPKYTFDFSEEDDD ADDDDDNDNDLEELKVKASPI TNDGEDEFVPSDGLDKDEYTF PGKSKATPEKSLHDKKSQDFGNLFSFPSYSQKSEDDSAKFDSN EEDSASVFSFSGFLKQTDKVPSKTVAACKGKPSDTPVPPKRA PKQKKVVEAVNSDSDSEFGIPKKTTPKGKGRGAKKRKASGSE NEG DYNPGRKTSKTTSKKPKKTSFDQSDVDIFPSDFPTEPPS LPRTGRARKEVKYFAESDEEDDDVDFAMFN
423	1162	1	219	KGCLAASFNCIFLYTGELYPTMIR*VEA*WENDSLFLGKDILL CTGQTPELNQVHPSPKAPPNTHHCKAHSSH

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424	1163	1454	446	ENSFECKDCGKAFSRGYQLSHHQKIHTGEKPYECKECKKAFRW GNQLTQHQQKIHTGEKPYECKDCGKAFRWGSSLVVHKRIHTGEK PYECKDCGKAFRRGDELTOHQRFHTGEKDYECKDCGKTFSRVY KLIQHKRIHSGEKPYECKDCGKAFCGSSLIQHKRIHTGEKPY ECQECGKAFTRVNYLTQHQQKIHTGEKPECKECKGKAFRWGSSL VKHERIHTGEKPYKCTECGKAFCGNYHLTQHERIHTGETPYKC KECGKAFTYGSLLVKHERIHTGVKPYGCTECGKSFSHGHQLTQ HQKTHSGAKSYECKECKGACNHLNHLREHQRIHNS
425	1164	826	407	HQYLLDLYPLHVMTILLKSHFFTMLKRPVGSSEFASLPFYHQS ILLRKNQMKRKKTKQDLTHINWTLQAVSIQTCIWLQKKPSSYF HQLPNQVL*PENSGPESCLYDLAAVVVHHGSG
426	1165	464	29	XLDPTLPAVATLLMDVMFYNSGVKDPMATGDDCGHIRFFSFS LIEGYISLVMQVQTOQRFPSNLLFTSASGELWKMVRIGGQPLG FGPVWESGPTGPTSPILPVTPTSSSHRQAASQVTTTKQGQWLC LKRPSARSPDHTACLG*
427	1166	649	901	EAPLTSVCFSLERRFGSSSNTTSFGTLASQNAPTFGSLSQOTS GFGTQSSGFGSGFGSGTGGFSFGSNNS*VSPFLSLTLIKSIK
428	1167	3	340	EEPQGSPIVWVLGSLTSVSCFLPFQRMRIKPHQGQYIGEMSF LQHHKGECPQKD*ARQENPCGPCSERRKHLGQDPKTKCSC KNTDSRCKARPLELNERTCRCDKPRR
429	1168	355	1312	TLWAGPGLCPQSHSSSSVPAPWEPHVERALRTRDNQQRPLLS ASWAPAPARPLFLTSPVLLPKSRAIPAARDPS*AGIFCLLEMA GGQASVVIIGSAGVLGCRWGSSGKSHSLSPSRKGNLHLLSQEP QTTVHNATDGIKSTESCNNTTTEDEDLKVRKQEI KITEQLI EAINNGDFEAYTKICDPGLTSFEPEALGNLVEGMDFFHKFYFEN REWVRAADILLPAPLPLCLCLLLTFSSQLPTFFLFDLRAALLL CMLVPLCPDGCRAPLKALLLSSKCHSFCSCFVAVPVTTIKLT YFLPGAVAYACNPNTLGG
430	1169	439	728	ERAGAGGAAACRAGTRSGATSRTPWPLHRQLSMMLMLAQSNPQ LFALMGTRAGIARELERVEQQSRLEQLSAAELQSRNQGHWADW LQAYRARLGO
431	1170	3	440	NGTLFIMVMHIKDLVSDYKE*WL*RKPLPW*EALLLRDCFFF* VTENGADPNPYVKTYLLPDNHKTSKRKTKISRKTRNPTFNEML VYSGYSKETLRQRELQLSVLSAESLRENFFLGGVTLPLKDFNL SKETVKWYQLTAATYL



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432	1171	433	1824	LHRIMQLAVVVSQVLENGSSVLVCLEEGWDITAQVTSLVQLLS DPFYRTLQFLDCVHQVHNQYPTFEFENLYYLKFLAFHYVSNRFTFL DSDYERLEHGTFLFDDKGEKHAKKGVCIWECIDRMHKRSPIFFN YLYSPLEIEALKPNVNVSSLLKKWDYIIEETLSTGPSYDWMMLT PKHFPSESDSLAGEAGPRSQRRTVWP CYDDVSTQPDALTSLF SEIEKLEHKLNQAPEKWQQLWERVTVDLKEEPRTDRSQRHLSR SPGIVSTNLPSYQKRSLHLPLDSSMGEEQNSSISPSNGVERRA ATLYSQYTSKNDENRSFEGTLYKRGALLKGWKPRWFVLDVTKH QLRYYDSGEDTSCCKGHIDLAEVEMVIPAGPSMGAPKHTSDKAF FDLKTSKRVYNFCAQDQSAQQWMDKIQCISDA
433	1172	1714	946	EVEGPRRVS PAPETLGMEE SVVRPSV FVVDGQTDI PFTRLGRS HRRQSCSVARVGLGLLLLLMAGLAVQGWFLLQLHWRLGEMVT RLPDGPAGSWEQLIQERRSHEVNPA AHLTGANSSLTGSGGPLL WETQLGLAFLRGLSYHDGALVVTKAGYIIYSKVQLGGVGCPL GLASTITHGLYKRTPRYPEELELLVSQQSPCGRATSSSRVWWD SSFLGGVVHLEAGEEVVVRVLDRLVRLRDGTRSYFGAFMV
434	1173	16	367	QSAELGPRRREGSRPSCTKASKPWRRRPGGPTSGLG*GPLSP GPYQCRPSLPAQLYPQSLMAAATLRTPTQVSAASSRPHTPSPT HVLKPSVRGACSSPRCPGSGTLRRSWVGPF
435	1174	27	1139	LWWPPLSRHAAHRQWPGPTAPRGLGHKVKGRGASPAAMWSCSW FNGTGLVEELPACQDLQLGLSLLSLLGLVVGVPVGLCYNALLV LANLHASKASMTMPDVYFVNMAVAGLVLSALAPVHLLGPPSSRW ALWSVGGEVHVALQIPFNVSLLVAMYSTALLSLDHYIERALPR TYMASVYNTRHVC GFVWGGALLTSFSSLLFYICSHVSTRALEC AKMQNAEAADATLVFIGYVVPALATLYALVLLSRVREDTPLD RDTGRLEPSAHRLLVATVCTQFGLWTPHYLILLGHTV IISRGK PVDAYHLGLLHFVKDFSKLLAFSSSFVTPLLYRYMNQSFPSKL QRLMKKLPCGDRHCS PDHMGVQQVLA
436	1175	322	756	SESELTLMPSLPTTNCVHSLQMIPPLSPAPNQELVLGLCYMS YLAFLYMTFDFCCLYFSTVYAPSFKYICVHTDTHICVCVCIYL SSVSKSSAEADGVLQPRRHPASLLIVFATSISESSLLIFSFO KTEAKLIVFAVSLAAK
437	1176	2	153	FFFLRQSLTSLSPRLECSGATSASPSAGITGMSHHSQPIVNFLR ACIPISK
438	1177	1	692	RQHAEEGRNRNPKTGLTLERVGPESSPYLLRRHQ RQGQGEHY HSCVQLAPTRGLEES/GHGPI/SLAGGPRVGGV/AAAATEAPR MEWKVKVRS DGTTRYVAKRPVRDRLLKARALKIREERSGMTTDD DAVSEMKG RYWSKEERKQHLIRAREQRKRREFMMQSRLECLR EQQNGDSKPELNI IALSHRKTMKKRNNKKILDNWTITQEMLAHG ARSADGKRVYNPLLSVTTV

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439	1178	2	616	SDRGCSAAAGRNMTAVGVQAQRPLGQRQPRRSFFESFIRTLII TCVALAVVLLSSVSI CDGHWLLAEDRLFGLWHFCTTTNQSVPIC FRDLGQAHVPGLAVGMGLVRSVGALAVVAIFGLEFLMVSQLC EDKHSQCKWVMGSILLLVSFVLSSGGLLG FVILLRNQVTLIGF TLMFWCEFTASFLLFLNAISGLHINSITHPWE
440	1179	2	540	QILPNLYLGSARDSANLES LAKLGIRYILNVTNPNPNFFKNG DFHYKQIPISDHWSQNLRSRFFPEAIEFIDEALSQNCVGLVHCL AGVSRSVTVTVAYLMQKLHLSLNDAYDLVKRKSNI SPNFM GQLLDFERSLRLEERHSQE QSGGQASAASNPPSFFTPTSDG AFELAPT
441	1180	940	463	RKSLHENKLRKLEKVEVLEAKKEELETENQVLNRQNVFPEDY TRLQKRLKDIQRRHNEFRSLILVPNMPPTASINPVSFQSSAMG SKHGTTISSYAGGTTSKGTLSQKTRRTGNNTKKTTRGTWI FRMMFLENRQIKRGEVGD SVKLDILT CGI
442	1181	1	986	GRPGAGASELFPSVT TDL SVSKQNA CLTCVDFVT VHVCMGFWG IGPGALSTSCIPYPLSHGPGSVKAEMLMYSQKDP LIL CVRLA VLLAVTLTVPVVLFPIRRALQQLLP GKAFSWPRHVAIALILL VLVNVLVICVPTIRDFGVIGSTSAPSLIFILPSIFYLRI VPS EVEPFLSWPKIQALCFGLGVLFMAVSLGFMFANWATQSRMS GH*SGPAGPGPCAHAHGGVRAAP*GPS CPTCGGWFP*TWLSE AGDSRGCRLAHFPPPGQCQAWIMALIPTPTPEEEEEEEEEEE EEEEEEEEEEARSWSLCPAQSSLP PPG
443	1182	460	27	INELRYHLEESRDKNVLLCLEERDWD PGLAIIDNLMQSI NQSK KTVFVLTKKYAKSWNFKTA FYLALQRLMDENMDV IIFILLEPV LQHSQYLRLRQRICKSSILQWPDNPKA EGLFWQTLRNVVL TEN DSRYNNMYVDSIKQY
444	1183	1682	230	DDPIKTSWTPPRYVLSMSEERHERVRK KYHILVEGDGIPPPIK SFKEMKFPAAILRGLKKKG IHHPTPIQIQGIPTILSGRDMIGI AFTGSGKTLVFTLPVIMFCLEQEKRLPFSKREGPYGLI ICPSR ELARQTHGILEYYCRL LQEDSSPLLRCALCIGGMSVKEQMETI RHGVHMMVATPGRLMDLLQKKMVS LDCRYLALDEADRMIDMG FEGDIRTIFSYFKGQRQTLLFSATMPKKIQNFASALVKPV TI NVGRAGAASLDVIEVEYVKEEAKMVYLLECLQKTPPPVLIFA EKKADVDAIHEYLLKGV EAVAIHGGKDQEERTKAIEAFREGK KDVLVATDVASKGLDFPAIQHVINYDMPEEIEIENYVHRIGRTGR SGNTGIATTFINKACDES VMLDLKALLLEAKQKVPVVLQVLHC GDESMLDIGGERGCAFCGGLGHRITDCPKLEAMQTKQVSNIGR KDYLAHSSMDF
445	1184	1	375	IETTQPS EDTNANSQDNMQPETSSQQQLLSPTLSDRGGS RQD AADAGKPQRKFGQWRLPSAPKPI SHSVSSVNLRFGRRTTMKSV VCKMNPMTDAASC GSEVKKWTRQLTVESDES GDDLLDI
446	1185	2	223	NDRFSACYFTLKLKEAAVRQREALK KLTKN IATDSYISVNL RD VYARSIMEMLRLKGRERASTRSSGGDDFWF

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447	1186	2	1031	FTVFILGITIRPLVEFLDVKRSNKKQAVSEETICRLFDHVKT GIEDVCGHWGHNFWRDKFKKFDCKYLRLKLLIRENQPKSSIVSL YKKLEIKHAIEMAETGMISTVPTFASLNDCKEERKIRKVTSSST DEIRELLSRNLYQIRQRTLSYNRHSLTADTSEKQAEILIRRR HSLRESIRKDSLSNREHRASTSTSRYSLSLPKNTKLPEKLQKRR TISIADGNSSSDADAGTTVLNLQPRARRFLPEQFSKSKSPQSY KMEWKNEVDVDSGRDMPSTPPTPHSREKGTQTSGLLQQPPLLSK DQSGSEREDSLTEGIPPKPPRLVWRASEPGSRKARFGSEKP
448	1187	3	444	HEEASGLSVWMGKQMEPLHAVPPAATLILSLVAVFTCTSN VATTTTLFLPIFASMSRSIGLNPLYIMLPCTLSASFAMLPVAT PPNAIVFTYGHLLKVADMVKTGVIMNIIGVFCVFLAVNTWGRAI FDLDHFPDWANVTHIET
449	1188	3	125	HELENNWLQHEKAPTEEGKKELLALSNNANPSLLERHCAYL
450	1189	1	188	GNIIYMYMQPGARSSQDQKFLTLFYNIIVTPLLNLPIYTLRNR EVKGALGRLLLGKRELKGE
451	1190	10	1879	PLEQRSNCRVDPVRVTHTMASDTSSLVQSHTYKKREPADVPYQ TGQLHPAIRVADLLQHITQMKCAEGYGFKEEYESFFEGQSAPW DSAKKDENRMKNRYGNI IAYDHSRVRLQTIEGDTNSDYINGNY IDGYHRPNHYIATQGPMEQTIYDFWRMVWHENTASIMVTNLV EVGRVKCKKYWPDDEIYKDIKVTLIETELLA EYVIRTFAVEK RGVHEIREIRQFHFTGWPDHGVVPYHATGLLGFVRQVSKSPPS AGPLVVHCSAGAGRTGCFIVIDIMDMAEREGVVDIYNCVREL RSRRVNMVQTEEQYVFHDAILEACLCGDTSPASQVRSLLYD MNKLDPTNSSQIKEEFRTLNMVPTLRLVEDCSIALPRNHEK NRCMDILPPDRCLPFLITIDGESSNYINAALMDSYKQPSAFIV TQHPLPNTVKDFWRLVLDYHCTSVVMLNDVDPAQLCPQYWPEN GVHRHGPIQVEFVSADLEEDIISRI FRIYNAARPQDGYRMVQQ FQFLGWPMYRDTPVSKRSFLKLIRQVDKWQEEYNGGEGRTVVH CLNGGGRSGTFCAISIVCEMLRHQRTVDVFHAVKTLRNNKPNM VDLLDQYKFCYEVALEYLNSG
452	1191	603	342	PLTYNKKYTYPPWGDALGWLLALSSMVCIPAWSLYRLGTLKGP FRERIRQLMCPAEDLPQRNPAGPSAPATPRTSLRLTELESHC
453	1192	120	449	TLSESGALFSLGPPPLSLKSSSAPRPYSTLRDCLEHFAELFDL GFPNPLAERIIFETHQIHFANCSLGQPTFSDDPPEDVLLAMIIA PICLIPFLITLVVWRSKDSEAQA
454	1193	1838	1066	CEEREQEKDDVDVALLPTIVEKVILPKLTVIAENMWDPFSTTQ TSRMVGITLKLINGYPSVNAENKNTQVYLKALLLRMRRLDD DVFMPLYPKNVLENKNSGPYLFQRFWSSVKLLGNFLQWYGI FSNKTQLQELSIDGLLNRYILMAFQNSEYGDSDIKKAQNVINCF PKQWFMNLKGERTISQLENFCRYLVHLADTIYRNSIGCSDVEK RNARENKQIVKLLASVRALDHMSVASDHNVKEFKSLIEGK

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455	1194	112	1361	TPFCFLCSLVFRSRVWAEPC LIDAAKEEYNGVIEEFLATGEKL FGPYVWGRYD LLEFPPSFPFGGMENPCLTFVTPCLLAGDRSLA DVIIEISHSWFGNLTNANWGEFWLNEGFTMYAQRRTSTILF GAAYTCLEAATGRALLRQHMDITGEENPLNKL RVKIEPGVDPD DTYNETPYEKGFCFVS YLAHLVGDQDQFDSFLKAYVHEFKFRS ILADDFLD FYLEYFPELKKKRVDIIPGFEFDRWLNTPGWPPYL PDLSPGDSLMPAEELAQ LWAAEELDMK AIEAVAI SPWKTYQL VYFLDKILQKSP LPPGNVKKLGDTYPSISNARNAELRLRWGQI VLKNDHQEDFWKVKEFLHNQ GKQKYTLPLYHAMMGSEVAQTL AKETFASTASQLHSNVVNYVQQIVAPKGS
456	1195	1	889	CASGSSGWRPVLWAGAF TMSAE LDTTIEIPDQPCWSQKNSPS PGGKEAETROPV VILLGWGGCKDKNLAKYS AIYHKGRCIVIRY TAPWHMVFFSESLGIPSLRVLAQKLELLFDYIEKEP LLFHV FSNGGVMLYRYVLELLQTRRF CRLRVVGTIFDSAPGDSNLVGA LRALAA ILERRAAMLRL LLLVAFALVVVLFHVLLAPITALFHT HFYDRLQDAGSRWPELYLYSRADEVVLARDIERMVEARLARRV LARSVDFVSSAHVSHLRDYPTTYTSLCVD FMR \NWVRC
457	1196	2	295	PRVRDRLPSTGVRDRKGDKPWKESGGSVEAPRMGFTHPGHLS GCQSSLASGETGTGSADFPGGPRPGLTRRAPVKDTPGRAPAAD AAPAGPSSCLG
458	1197	1299	682	QGRTSCIGLYTYQRRICKYRDQYNWFFLARPTTF AIENLKYF LLKKDPSQP FYLGHTIKSGDLEYVGM EGGIVLSVESMKRLNSL LNIPEKCP EQGGM IWKISEDKQLAVCLKYAGVFAENAEDADGK DVFNTKSVGLS I KEAMTYHPNQVVEGCCSDMAVT FNGLTFNQM HVMMYGVYRLRAFG \HIFNDALVFLPPNGSDND
459	1198	779	61	HEGKPTRGRGRGGSLS TRGRGSEVPDSAHLAPTPLFSESGCCG LRSRFLTDCKMEEGGNLGLIKMVHLLVLSGAWGMQMWTFVS GFLLFRSLPRHTFGLVQSKLPFYFHISMGC AFINLCILASQH AWAQLTFWEASQLYLLFSLSLTLATVNARWLEPRTTAA MWALQT VEKERGLGGEVPGSHQGPDPYRQLREKDPKYSALRQNFFRYHG LSSLCNLGCVLSNGLCLA \ALPWK
460	1199	517	815	KQLDKQLRADPSGSLPPLPPSPPPPLEAGGRPPEVP/PRGPSA VPSFPSVSGDWGGPVEAG/EGGQQGRGRARARPCSLPPLPPS PVCRLSGSRAPLGCDG
461	1200	1	583	RNQLSSQKSVWPVPIKSLPLWATVVAHFSYNWTFYTLTLLP TYMKEILRFNVQENGFLSSLPYLGSWLCMILSGQAADNLRAKW NFSTLCVRRIFSLIGMIGPAVFLVAAGFIGCDYSLAVAF LTIS TTLGGFCSSGFS INHLDIAPSYAGILLGITNTFATIPGMVGPV IAKSLTPDMGISLHRPGWSAVA
462	1201	25	383	GPSGTTHASAHSGHPGSPRGSLSRHPSSQLAGPGVEGGEGTQK PRDYIILA ILSCFCFPMWPVNIVAFAYAVMSRNSLQQGDVDGAQ RLGRVAKLLS IVALVGGVLI I IASCVINLGVIK
463	1202	573	372	SLFLSFPPLSFKMTLNDAMRNKARLSITGSTGENGRVMTPEFP KAVHAVPYVSPGMGMNVSVTDLS

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464	1203	2018	491	DDVPPPAPDLYDVPPGLRRPGPGTLYDVPRERVLPPPEVADGGV VDSGVYAVPPPAEREAPAEGRKLSASSTGSTRSSQSASSLEVA GPGREPLELEVAVEALARLQQGVSAATVAHLLDLASAGATGSW RSPSEPQEPVLVQDLQAAVAQSAVHELLEFARSAGVNAHTS DRALHAKLSRQLQKMEDVHQTTLVAHGQALDAGRGGSGATLEDL DRLVACSRAPVEDAKQLASFLHGNASLLFRRTKATAPGPEGGG TLHPNPTDKTSSIQSRPLPSPPKFTSQDSPDQGYENSEGGWME DYDYVHLQGKEEFKTKKELLEKGSITRQGSQLELQQLKQFE RLEQEVSRPIDHDLANWTPAQPLAPGRTGGLGPSDRQLLLFYL EQCEANLTTLTNAVDAFFTAVATNQPPIFVAHSAKFVILSAHK LVFIGDTLSRQAKAADVRSQVTHYSNLLCDLLRGIVATTKAAA LQYPSPSAAQDMVERVKELGHSTQQFRRVLGQLAAA
465	1204	299	189	EMEEPQKSYVNTMDLERDEPLKSTGPGQISVSEFSCHCCYDILV NPTTLNCGHSFCRHCLALWASSKKTECEPECREKWRGFPKVS I LLRDAIEKLFPPDAIRLRFEDIQQNNDIVQSLAAFQKYGNDQIP LAPNTGRANQQMGGGFFSGVLTALTGVAVVLLVYHWSRESEH DLLVHKAVAKWTAEVVLWLEQLGPWASLYRERFLSERVNGRL LLTLTEEEFSKTPYTIENSSHRRAILMELERVKALGVKPPQNL WEYKAVNPGRSFLFLYALKSSPRLSLLYLYLFYDITDFTLPIH TICPLQEDSSGEDIIVTKLLDLKEPTWKQWREFLVKYSFLPYQL IAEFADWLEVHYWTSRFLIINAMLLSVLELFSFWRIWSRSEL K*VGFRFLRLGVAALGSVEVAGLRGVVKGERPLLYGHGAGARF PHSVLLLPVAKPLPLPLPRGLC
466	1205	2	242	EKARMIYEDYISILSPKEVSLDSRVREVINRNLDPNPHMYED AQLQIYITLMHRDSFPRFLNSQIYKSFVESTAGSSSES
467	1206	2	619	LYYSQDEESKIMISDFGLSKMEGKGDVMSTACGTPGYVAPEVL AQKPYSKAVDCWSIGVIAYILLCGYPFFYDENDSKLFEQILKA EYEFDSPYWDIDISDAKDFIRNLMEKDPNKRYTCEQAARHPWI AGDTALNKNIHESVSAQIRKNFAKSKWRQAFNATAVVRHMRKL HLGSSLDSSNASVSSSLASQKDCASGTFHAL
468	1207	1	352	RTRGGAVSFEDFIKGLSILLRGTVQEKLNWAFNLYDINKDGYI TKEEMLDIMKAIYDMMGKCTYPVLKEDAPRQHVETFFQKMDKN KDGVVITIDEFIESCQKDENIMRSMQLFENVI
469	1208	3	1015	PRSPHEHTPAWHEGRSLGPIMASMADRNMKLFSGRVVPAQGE TFENWLTQVNGVLPDWNMSEEEKLRMLKTLRGPAREVMRVLQ ATNPNLVADFLRAMKLVFGESESVTAHGKFFNTLQAQGEKA SLYVIRLEVQLQNAIQAGTIAEKDANRTRLQQLLGGELSRDL RLRLKDFLRMYANEQERLPNFLELIKMVREEDWDDAFIKRKR PKRSESMVERAVSPVAFQGSPPPIVIGSADCNVIEIDDTLDDSD EDVILVESQDPPLPSWGAPPLRDRARPQDEVVIDSPHNSRAQ FPSTSGGSGYKNNPGEMRRARKRKHTIRCSYCGEE
470	1209	1543	1351	SVACTVPLRSMSPDQDFDKEPDSSTKHSTPSNNSNPSPGPPS PNSPHRSQPLFEGLEQPACDT

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471	1210	3	952	YSAVEFAERGGSSGDELREDDEPVKKRGRKGRGRGPPSSSD SEPEAELEEREAKKSAKKPQSSSTEPARKPGQKEKVRPEEKQQ AKPVKVERTKRSEGFSDMRKVEKKKEPSVEEKLQKLHSEIKF ALKVDS PDVKRCLNALEELGTLOVTSQILQKNTD VVATLKKIR RYKANKD VMEKAAEVYTRLKSRVLGPKIEAVQKVNKAGMEKEK AEEKLAGEELAGEEAPQEKAEDKPSTDL SAPVNGEATSQKGES AEDKEHEEGRDSEEGPRCGSSEDLHDSVREGPD LDRPGSDRQE RERARGDSEALDEES
472	1211	5204	2901	LAELSSLSVLRLSHNSISHIAEGAFKGLRSLRVLDLDHNEISG TIEDTSGAFSGLDLSLSKLTFLGNKIKSVAKRAFSGLEGLEHLN LGGNAIRSVQFADFVKMKNLKELEHSSDSFLCDCQLKWLPPWL IGRMLQAFVTATCAHPESLKGQSIFSVPPESFVCDLFPQII TQPETTMAMVGKDIRFTCSAASSSSSPMTFAWKDNEVLTNAD MENFVHVHAQDGEVMEYTTILHLRQVTFGHEGRYQCVI TNHFG STYSHKARLT VNVLPSTFKTPHDITIRT TTMARLECAATGHPN PQIAWQKDG GTDFPAARERRMHVMPDDDVFFITDVKIDDAGVY SCTAQNSAGSISANATLTVLETPSLVVPLEDRVVS VGETVALQ CKATGNPPPRITWFKGDRPLSLTERHHLTPDNQLLVVQNVVAE DAGRYTCEMSNTLGTERAHSQLSVLPAAGCRKDGT TVGIFTIA VVSSI VLTSLVWVCIIYQTRKKSEEYSVTNTDET VVPPDVPSY LSSQGTLSDRQETVVRTEGGPQANGHIESNGVCPRDASHFPEP DTHSVACRQPKLCAGSAYHKKPWKAMEKAEGTPGPHKMEHGGR VVCSDCNTEVDCYSRGQAFHPQPVS RDSAQPSAPNGPEPGSD QEHS PHHQCSRTAAGSCPECQGS LYP SNHDRMLTAVKKKPMAS LDGKGDSSWTLARLYHPDSTELQPASSLTSGSPERAE AQYLLV SNGHLPKACDASPESTPLTGQLPGKQRPVPLLLAPKS

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473	1212	2	2466	AAAGAARRVSVRCGRSGPGPGRGAAGLSPADIALASEQGASCS VRAPERKLRLMKLLWQAKMSSIQDWGEEVEEGAVYHVTLRVQI QQAANKGARWLGVGEGDQLPPGHTVTSQYETCKIRTIKAGTLEKL VENLLTAFGDNDFTYISIFLSTYRGFASTKEVLELLLDRYGNL TSPNCEEDGSQSSSESKMVIRNAIASILRAWLDQCAEDFREPP HFPCLQKLLDYLTRMMPGSDPERRAQNLLLEQFQKQEVETDNGL PNTISFSLEEEEELEGGESAEFTCFSEDLVAEQLTYMDAQLFK KVVPHHCLGCIWSRRDKKENKHLAPTIRATISQFNTLTCKVVS TILGGKELKTQQRAKIIEKWINIAHECRLKKNFSSLRAIVSAL QSNSIYRLKKTWAAVPRDRMLMFEELSDIFSDHNNHLTSRELL MKEGTSKFANLDSVKENQKRTQRRLLQKQDMGVMQGTVPYLG TFLTDLTMDLTALQDYIEGGLINFEEKRRREFEVIAQIKLLQSA CNSYCMTPDQKFIQWFQRQQLLTEEESYALSCEIEAAADASTT SPKPWKSMVKRLNLLFLGADMITSPPTKEQPKSTASGSSGES MDSVSVSSCESNHSEAEEGYITPMDTPDEPQKKLSESSSYCSS IHSMDTNFLQGMSSLINPLSSPPSCNNNPKIHKRSVSVTSITS TVLPVPVYNQONEDTCIIRISVEDNNGNMYKSIMLTSQDKTPAV IQRAMLKHNLDSDPAEEYELVQVISEDKELVIPDSANVFYAMN SQVNFDFILRKKNSMEEQVKLRSTSLTLPRATAKRGCSNRHS KITL
474	1213	1	867	AREKMDSCIEAFGTTKQKRALNTRMNRVGNESLNRAVAKAAE TIIDTKGV TALVSDAIHNDLQDDSLYLPPCYDDAAKPEDVYKF EDLLSPA EYEALQSPSEAFRNV TSEEILKMIEENSHCTFVIEA LKSLPSDVESRDRQARCIWFLDTLIK FRAHRVVKRSALGPGV PHIINTKLLKHFTCLTYNNGRLRLNISDSMKAKITAYVILAL HIHDFQIDLTVLQORDLKLSEKRMMETAKAMRLKISKRRVSVA GSEEDHKLGTLTSLPLPPAQTSDRLAKRRKIT

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475	1214	2	2621	LSLFSGSRALGRSGARAMAKAKKVGARRKASGAPAGARGGPAKANSNPFEVKVNRQKFQILGRKTRHDVGLPGVSRARALRKRTQTL LKEYKERDKSNVFRDKRFGEYNSNMSPEEKMMKRFALQQRRH EKKS IYNLNEDEELTHYGQSLADIEKHNDIVSDSDAEDRGTL SGELTAAHFGGGGGLLHKKTQQEGEEREKPKSRKELIEELIAK SKQEKRRERQAQREDALELTEKLDQDWKEIQTLSSHKTPKSENRR DKKEKPKPDAYDMMVRELGFEMKAQPSNRMKTEAELAKEEQEH LRKLEAERLRRLGKDEDENVKKPKHMSADDLNDGFVLDKDDR RLLSYKDGKMNVEEDVQEEQSKEASDPESNEEEGDSSGGEDTE ESDSPDSHLDLESNVESEENEKPAKEQRQTPGKGLISGKERA GKATRDELPTYFAAPESYEELRSLLLGRSMEEQLLVVERIQKC NHPSLAEGNKAKLEKLFGLLEYVGDLATDDPDLTVIDKLIV HLYHLCQMFPEASASDAIKFVLRDAMHEMEEIETKGRAALPGL DVLIYLIKITGLFFPTSDFWHPVVTALVCLSQLLTCKPILSLQ DVVKGLFVCCLFLEYVALSQRFIPELINFLLGILYIATPNKAS QGSTLVHPFRALGKNSSELLVVSAREDVATWQQSSLSLRWASRL RAPTSTEANHIRLSCLAVGLALLKRCVLMYGSLSFHAIMGPL RALLTDHLADCSHPQELQELCQSTLTMESQKQLCRPLTCEKS KPVPLKLFTPRLVKVLFEFGRKQGSSKEEQERKRLIHKHKREFK GAVREIRKDNQFLARMQLSEIMERDAERKRKVKQLFNSLATQE GEWKALKRKKFKK
476	1215	3	961	LTKQEDCCSGSIGTAWGQSKCHKCPQLQYTGVPKPGPVRGEVGA DCPQGYKRLNSTHCQDINECAMPGVCRHGDCLNPGSYRCVCP PGHSLGPSRTQCTIADKPEEKSLCFRLVSPHQHPLTTRLTR QLCCCSVGKAWGARCQRCPTDGTAAFKEICPAGKGYHILTS HQ TLTIQGESDFSFLHPDGPPKPPQLPESPSQAPPEDTEEERG VTTDSPVSEERSVQQSHPTATTTTPARPYPELISRPSPTMRWF LPDLPPSRSAVEIAPTQVTETDECRLNQNICGHGECVPGPPDY SCHCNPGYRSHPPQHYCV



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477	1216	3652	1207	MAGGHCGSFPAAGSGEIVQLNVGGTRFSTSRQTLMWIPDSF FSSLLSGRISTLRDETGAIFIDRDPAAAFILNFLRTKELDLR GVSINVLRHEAEFYGITPLVRRLLLCEELERSSCGSVLFHGYL PPPGIPSRKINNTVRSADSRNGLNSTEGEARGNGTQPVLSGTG EETVRLGFPVDPKVLIVAGHHNWIVAAYAHFAVWYRIKESG WQQVFTSPYLDWTIERVALNAKVVGPHGDKDKMVAVASESSI ILWSVQDGGSGSEIGVFSLGVPVDALFFIGNQLVATSHTGKVG VWNAVTDHQQVQDVVPITSYDTAGSFLLLGCNNGSIYYIDMQK FPLRMKDNDLLVTELYHDPNDATALSVYLTPTKTSVSGNWIE IAYGTSSGAVRVIVQHPETVGSGPQLFQFTFVHRSPVTKIMLS EKHLVSVCADNNHVRTWTVTRFRGMISTQPGSTPLASFILSL EETESHGSISSGNDIGPFGERRDDQQVFIQKVVPITNKLFRVLS STGKRICHIAVDCTTISSFTGRECEGSSRMGSRPRRYLFTGH TNGSIQMWDLTTAMDVMNKSEDKDVGGPTEERLLKLLDQCCLS TSRCATPNISPATSVVQHSRLRESNSSLQLOHHDTHHEAATYG SMRPYRESPLARARRTESFHSYRDFQITNLNRNVERAVPENG NLGPIQAEVKGATGECNISERKSPGVEIKSLRELDGSLVHVKI AEGFSESKKRSSDENENKIEFRKKGGFEGGGFLGRKKVPYLA SSPSTSDGGTDSPTASPSPTKTTTPSPRHKKSDDSSGQEYSL
478	1217	1	1379	RRPTRPILTDELFKRTIQLPHLKTLLNNGKLETSLVSCFAN NTPLEHLDLSONLLOHKNDENCWPETVVMNLSYNKLSDSVF RCLPKSIQILDNNNQIQTVPKETIHLMALRELNIAFNFLTDL PGCSHFSLSVLNIEMNFILSPSLDFVQSCQEVKTLNAGRNP RCTCELKNFIQLETYSVMMVGVSDSYTCEYPLNLRGTRLKDV HLHELSCNTALLIVTIVVIMLVGLAVAFCCCLHFDLPWYLRML GQCTQTHRVKTTQEQKLRNVRFAFISYSEHDSLVVKNELI PNLEKEDGSILICLYESYFDPGKSISENIVSFIEKSYKSI FVL SPNFVQNEWCHYEFYFAHNNLFHENS DHIIILILEPIPFYCIP TRYHKLKALLEKKAYLEWPKDRRKCGLFWANLRAAINVNLAT REMYELQTFTELNEESRGSTISLMRTDCL
479	1218	1	1099	PTRPPTRPPTRPLLTSPSWTSTGRMWSHLNRLLFWSIFSSVTCR KAVLDCEAMKTNEFPSPCLDSKTKVVMKGQNVSMFCSHKNKSL QITYSLFRRKTHLGTQDGKGPAIFNL SITEAHESGPYKCKAQ VTSCSKYSRDFSFTIVDPVTSPVLNIMVIQTETDRHITLHCLS VNGSLPINYTFENHVAISPASKYDREPAEFNLTKKNPGEEE EYRCEAKNRLPNYATYSHPVTMPSTGGDSCPFLKLLLPGLLL LLVVIILILAFWVLPKYKTRKAMRNNVPRDRGDTAMEVG IYAN ILEKQAKEESVPEVGSRPCVSTAQDEAKHSQELQYATPVFQEV APREQEACDSYKSGYVYSELNF
480	1219	1	293	FFFFEERTGSHSVGHPRMEYSGVSMACSLNLLGSSNSPSSA SQDARTTGACQHAQLIGFFFF\ VETASPVQVTHAG/LKHLVSRN PSAVTSQSARIKT

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481	1220	1	727	NREGARKIQNKWLRPSRSHRTPEVSPPERYSYGTSSSSSKRTE GSCRRRRQSSSSANSQQGQWETGSPPTKRQRRSRGRPSGGAKR RRRGAPAAPQQQSEPARPSSEGKVTCDIRLRVRAEYCEHGPAL EQGVASRRPQALARQLDVFGQATAVLRSDLGSVVCDIKFSEL SYLDAFWGDYLSGALLQALRGVFLTEALREAVGREAVRLLVSV DEADYEAGRRRLLLMEEEGRRRPTAS
482	1221	1	1321	APNTAELRICRVNKNCGSVRGGDEIFLLCDKVQKDDIEVRFVL NDWEAKGIFSQADVHRQVAIVFKTPPYCKAITEPVTVKMLRR PSDQEVSESMDFRYLPDEKDTYGNKAKKQKTTLLFQKLCQDHV ETGFRHVDQDGLLELLTSGDPPTLASQSAGITVNFPERPRPGLL GSIGEGRYFKKEPNLFSHDAVVREMPGTGVSSQAESYYPSPGPI SSGLSHHSHMAPLPSSSWSSVAHPTPRSGNTNPLSSFSTRTLF SNSQGI PPFLRIPVGNLNASNACIYNNADDIVGMEASSMPSA DLYGISDPNMLSNCSVNMMTTSSDSMGETDNPRLLSMNLENPS CNSVLDPRDLRQLHQMSSSSMSAGANSNTTVFVSQSDAFEGSD FSCADNSMINESGPSNSTNPNSHGFVQDSQYSGIGSMQNEQLS DSFPYEFFQV
483	1222	1	1311	RRLSLLDLQLGPLGRDPPQECSTFSPTDSGEEPGQLSPGVQFQ RRQNQRRFMSMEDVSKRLSLPMDIRLPQEFLQKLQMESPDLPKP LSRMSRRASLSDIGFGKLETYVKLDKLGEGTYATVFKGRSKLT ENLVALKEIRLEHEEGAPCTAIREVSLLKNLKHANIVTLHDLI HTDRSLTLVFYLDSDLKQYLDHCGNLSMHNVKIFMFQLLRG LAYCHHRKILHRDLKPQNLLINERGELKLADFLARAKSVPTK TYSNEVVTWYRPPDVLLGSTYESTPIDMWGVGCIHYEMATGR PLFPGSTVKEELHKINRLLGTPTEETWPGVTAFFSEFRTYSFPC YLPQPLINHAPRLDTDGIHLSSLLLYESKSRMSAEALSHSY FRSLGERVHQLEDTASIFSLKEIQLQKDPGYRGLAFQPPGRGK NRRQSIF
484	1223	807	356	CTPHGSSSSWKIPLWPRHMSPLHSCLPVGSTSTSSGPLAVPRDC FHLCCCLWGQLLLISCPACGQGCRCRVAGGQHVPGQALGTLSP VSLLTWAGPSLDWPHPGSLVTPRCPILPAPVVLVKGLGGWPPT RPSRAAPVSGPVDQLPYFPGL
485	1224	1199	370	LISPVWGNIQRSRSVPLFPGLVGLGIWARGPLLLALLASFNI SVLNAECYLKQILHPTSHFTVSETPPLSGNDTDSLSCDSGSSA TSTPCVSRVLTGHLWASKNGRHLGLIEDYEALLKQISQGR LLAEMDIQTQEAPSSTSQELGTGKPHAPLSKFVSSVSTAKLT LEEAYRRLKLLWRVSLPEDGQCPLHCEQIGEMKAEVTKLHKKL FEQEKKLQNTMKLLQLSKRQEKVIFDQLVVTHKILRKARGNLE LRPGGAHPGTCSPSRPGS

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486	1225	2469	1660	LGLFCILPIDTLCAVLERDLSIRESRLFGAVVRWAEAEQCRQQLPVTFGNKQKVLGKALSIRFPLMTIEEFAAGPAQSGILSDREVVNLFHLFTVNPKEPRVEYIDRPRCCLRGKECCINRFQQVESRWGYSGTSDRIRFTVNRISIVGFGLYGSINGPTDYQVNIQIIEYEKKQTLGQNDTGFS CDGTANTFRVMFKEPIEILPNVCYTACATLKGPDSHYGTRKGLKKVHETPAASKTVFFFFSSPGNNNGTSIEDGQIPEIIFYT
487	1226	1193	372	SVWWNSEVQKDWQKRRGLRNSRATAGDIAHYRDRYVVKKGLGHNFVSGAVTAVEWGTPDPSSCGAQDSSPLFQVSGFLTRNQAQQPFSLWARNVVLATGTFDSPARLGIPGEALPFIHHELSALEAA TRVGAVTPASDPVLIIGAGLSAADAVLYARHYNIPVIHAFRRADVDPGLVFNQLPKMLYPEYHKVHQMREQSILSPSPYEGYRSLPRHQLLCFKEDCQAVFQDLEGVEKVFVSLVVLIGSHPDLSFLPGAG\LTLLQWILTSR
488	1227	756	1016	KLRPFIFSNQSLWLHSYEGAELEKTFIKGSWATFWVKVASCWACVLLYLGLLLAPLCWPPTQKQPPLILRRRRHRIISPDKYPPVQLIHLSHGYQIHWTDYYNVGTGRPEFGTRAHKS LAGAE LKTLKDFVTVLAKLFPGRPVKKLLEMLQEWLASLPLDRIPYNAVLDLVNNKMRISGIFLTNHIKWVCQGSRSSELRGYP CSLWKLFHTLTVEASTHPDALVGTGFEDDPQAVLQTMRRYVHTFFGCKECGEHFEEMAKESMDSVKTPDQAILWLKKHNMVNGRLAGEKPLGMGGSARAEGGPGPGTARTARLPWGLSLSFAASCHPLC
489	1228	1	747	QLIHLSHGYQIHWTDYYNVGTGRPEFGTRAHKS LAGAE LKTLKDFVTVLAKLFPGRPVKKLLEMLQEWLASLPLDRIPYNAVLDLVNNKMRISGIFLTNHIKWVCQGSRSSELRGYP CSLWKLFHTLTVEASTHPDALVGTGFEDDPQAVLQTMRRYVHTFFGCKECGEHFEEMAKESMDSVKTPDQAILWLKKHNMVNGRLAGEKPLGMGGSARAEGGPGPGTARTARLPWGLSLSFAASCHPLC
490	1229	4797	2398	HGGATFINAFVTTMCCPSRSSMLTGKYVHNHNVYTNNENCSSPSWQAMHEPRTFAVYLNNTGYRTAFFGKYLNEYNGSYIPPGWR EWLGLIKNSRFYNYTVCRNGIKEKHGFDYAKDYFTDLITNESI NYFKMSKRMYPHRPVMVISHAEPHPEDSAPQFSKLYPNASQ HITPSYNYAPNMDKHWIMQYTGPM LPIHMEFTNILQRKRLQTLMSVDDSVRLYNMLVETGELENTYIIYTADHGYHIGQFGLVKG KSMYPYDFDIRVPFFIRGPSVEPGSIVPQIVLNIDLAPTILDLIAGLDTPPDVDGKSVLKLDDPEKPGNRFRNTNKKAKIWRDTPFLVER GKFLRKKEESSKNIQQSNHLPKYERVKELCQARYQTACEQPG QKWQCIEDTSGKLR IHKCKGPSDLLTVRQSTRNL YARGFHDKD KBSCRESGYRASRSQRKSQRQFLRNQGT PKYKPRFVHTRQTR SLSVEFEGEIYDINLEEEELQVLQPRNIAKRHDEGHKGPRDL QASSGGNRGRMLADSSNAVGPPTTVRVTHKCFILPND SIHCER ELYQSARAWKDHKAYIDEEIEALQDKIKNLREVRGHLKRRKPE ECSCSKQSYNKEKGKQEKLSHLHPFKEAAQEVDSKLQLF KENNNRRKKERKEKRRQRKGEECSLPGLTCFTHDNNHWQTAPF WNLGSFCACTSSNNNTYWCRLTVNETHNLFCEFATGFLEYFD MNTDPYQLTNTVHTVERGILNQLHVQLMELRSCQGYKQCNPRPKNLDVGNKDGGSYDLHRGQLWDGWEG

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491	1230	2480	385	HLLIAQELADRVGEGRACWSLGNAYVSMGRPAQALTFAKKHLQ ISQEIHDRHGETARMNVAQLQLVLGRLTSPAASEKPDLAGYE AQGARPKRTQRLSAETWDLRLPLEREQNGDSHSHSGDWGRPSR DSLPLPVRSRKYQEGPDAERRPREGSHSPLDSADVRVHVPRTS IPRAPSSDEECFFDLLTKFQSSRMDDQRCPLDDGQAGAAEATA APTLEDRIAQPSMTASPQTEEFFDLIASSQSRLDDQRASVGS LPGLRITHSNAGHLRGHGEPQEPGDDFFNMLIKYQSSRIDDDR CPPPDVLPGRPTMPDEDDFFSLIQRVQAKRMDEQRVDLAGGPGA GGRRPARAPAAVPAWCELRPCAHRQAHPAPTGRGRSHSHSVL PRPLPRTGTGHAAPRPRPRATGSGQAARGGRACFHPGLAPMA LSFLPSAPAAGRTGPSACRPRPGAVRLPHPLPQALPVLPCPAK CETLLSPSPSPKVSLSRLLGPPRTGPCSVPELVLGWPCDRHA PPLQLRPGAGLPPSLSPHSPARGQQPQKAPQTTGHRPGCSGSP EVPPAESQGPAGASTGAGPISKAEGMAGHELHRSKTPSQEKGQ GLVLGMLTGSKSSAQSGWEVAPGSVTLTQVGGWSVEAGEASLS STLQTPHMRTPLLPPAGGDDITALSMGRGLTGHQVRDPRTGRT CWSLRWAPGA
492	1231	3	398	NSAADLAIFALWGLKPVVYLLASSFLGLGLHPISGHFVAEHYM FLKGHETYSYYGPLNWITFNVGHYHVEHDFPSIPGYNLPLVRK IAPEYYDHLPPQHHSWVKVLWDFVFEDSLGPYARVKRVYRLAKD GL
493	1232	1	214	QESGFSCCKGPGQNVAVTRAHPDSQGRRRRPERGARGGQVFYNS EYGELSEPSEEDHCSPSARVTFFTDNSY
494	1233	3	443	VIVHARPIRTRASKYIPEAVYGLPAYPAYAGGGGFVLSGATL HRLAGACAQVELFPIDDVFLGMCLQRLRLTPEPHPAFRFTFGIP QPSAAPHLSTFDPFCFYRELVVVHGLSAADIWLMWRLHGHGPHGP ACAHPPQVAAGPFQWDS
495	1234	1	897	MASAACSMDFIDSFELDLLFDRQDGI LRHVELGECWGHVKDQ VLPNPDSDDFLSSILGSGDSLPSPLWSPEGSDSGISEDLPD PQDTPPRSGPATSPAGCHPAQPGKGPCLSYHPGNSCSTTTPGP VIQQQHHLGASYLLRPGAGHCQELVLTDEKKLLAKEGITLPT QLPLTKYEERVLKKIRRKIRNKQSAQESRKKKKKEYIDGLETRS CCCPLPSSSSPPSALLAPTKPRALGTLRLYECSPELCTTMLPP AWLLMLCQAPRPQDPDPRLTQPEKSLQEAPQGTGASRTPT

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496	1235	4235	940	ARGRRSRPVWAASWGGRRGPAARRRPRGLAATMGFELDRFDGD VDPDLKCALCHKVLEDPLTTPCGHVFCAGCVLPVWVQEGSCPA RCRGRLSAKELNHVLPKRLILKLDIKCAYATRGCGRVVKLQQ LPEHLERCDFAPACRHRAGCGQVLLRRDVEAHMRDACDARVPG RCQEGCGLPLTHGEQRAGGHCCARALRAHNGALQARLGALHKA LKKEALRAGKREKSLVAQLAAQLELQMTALRYQKKFTEYSAR LDSLSRCVAAPPGGKGEETKSLTLVLRDSSGLGFNIIGRPS VDNHDGSSSEGI FVSKI VDSGPAAKEGGLQIHDR I IEVNGRDL SRATHDQAVEAFKTAKEPIVQVLRRTPRTKMFTPPSESQSLVD TGTQTDITFEHIMALT KMSSPSPVLDPYLLPEEHPSAHEYD PNDYIGDIHQEMDREELELEEVDLYRMNSQDKLGLTVCYRTDD EDDIGIYI SEIDPNSIAAKDGRIREGDRI IQINGIEVQNREEA VALLTSEENKNFSLITARAELQLDEGWMDDDRNDFLDDLHMDM LEEQHHQAMQFTASVLQQKKHDEGGTTDTATILSNQHEKDSG VGRTDESTRNDESSESEQENNGDDATASSNPLAGQRKLTCSDTL GSGDLFPFSNKSFI SPECTGAAYLGIPVDECERFRELLELKCQV KSATPYGLYYPGGLDAGKSDPESVDKELELLNEELRSIELEC LSIVRAHKMQQLKEQYRESWMLHNSGFRNYNTSIDVRRHELSD ITELPEKSDKSSSAYNTGESCRSTPLTLEISPDNSLRRAAEG ISCPSSSEGAVGTTEAYGPASKNLLSITEDPEVGTFPTYSPSLKE LDPNQPLESKERRASDGRSPTPSQKLGSAYLPSYHHSYPYKHA HIPAHQHYQSYMQLIQKSAVEYASQMSLVSMCKDLSSPTP SEPRMEWKVKIRSDGTRYITKRPVRDRLLRERALKIREERSGM TTDDDAVSEMKGMYWSKEERKQHLVKAKEQRRRREFMMQSRL DCLKEQQAADDRKEMNILELSHKKMMKKRNKKIFDNWMTIQEL LTHGTKSPDGTRVYNSFLSVTTV
497	1236	2	157	FFFLVEMGFCHVGQGGLTLIGSSNLPASASKSAGITGVSHCAR PDFKSCVE
498	1237	1	211	LAGRKVLLFVSGYVVGWGPITWLLMSEVLPLRARGVASGLCVL ASWLTAFLVLTKSFLPGGVSVQPQAPGP
499	1238	2	345	FWAPGPPGVGAAGVDASTRSLRESCPSPPGRRLRRTTAPWSSQ ARAAAPAPSSSSCRGPDGASSPRDL PWRPWKILRRTPLSGDVEL SQVHPDQRILRRFILSRTCNTIPGMAE
500	1239	1	523	MRRFLSKVYSFPMRKLILFLVFPVVRQTPTQHFKNQFPALHWE HELGLAFTKNRMNYTNKFLIPESGDYFIYSQVTRFGMTSECS EIRQAGRPNKPD SITVVITKVTD SYPEPTQLLMGTSVCEVGS NWFQPIYLGAMFSLQEGDKLMVNVSDISLVDYTKEDKTFFGAF LL

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501	1240	2	1277	FVWDEVAQRSGCEERWLVIDRKVYNISEFTRRHPPGSSRVISHY AGQDATDPFVAFHINKGLVKKYMNSSLIGELSP EQPSFEPTKN KELTDEFREL RATVERMGLMKANHVFLLYLLHILLDGAAWL TLWVFGTSFLPFLLCVLLSAVQAQAGWLQHD FGHLSVFSTSK WNHLHHHFVIGHLKGAPASWWNHMHFQHHAKPNCFRKDPDINM HPFFFFALGKILSVELGKQKKKYPYNH QHKYFFLIGPPALLPL YFQWYIFYFVIQRKKWVDLAWMITFYVRFFLT YVPLLGLKAFL GLFFIVRFLESNWFVWVTQMNHIPMHIDH DRNMDWVSTQLQAT CNVHKS AFNDWFSGHLNFQIEH LFPMPRHNYHKVAPLVQSL CAKHGIEYQSKPLLSAFADI IHS LKESGQLWL DAYLHQ
502	1241	999	540	QCGGIPYNTTQFLMNDRDPEEPNLDVPHGISHPGSSGESEAGD SDGRGRAHGEFQRKDFSETYERFHTESLQGRSKQELVRDYEL EKRLSQAEEETRRLQQLQACTGQQSCRQVEELAAEVQRLRTEN QRLRQENQMWNREGCRCDEEPT
503	1242	1448	875	SPERSSSLVSGREKAMEVPPAPRSFLCRALCLFPRVFAAEAVT ADSEVLEERQKRLPYVPEPYYPESGWDRLRELFGKD \VTGSLF RINVGLRGLVAGGIIGALLGTPVGGLLMAFQKYSGETVQERKQ KDRKALHELKLEEWKGR LQVTEHLPEKIESSLQEDEPENDAKK IEALLNLPRNPSVIDKQDKD
504	1243	149	1293	RSLGLAVTEMVPWVRTMGQKLKQRLRLDVGREICRQYPLFCFL LLCLSAASLLLNRYIHILMIFWSFVAGVVTFYCSLGPDSLLPN IFFT IKYKPKQLGLQELFPQGHSCAVCGKVCKRHRPSLLEN YQPWLDL KISSKVDASLSEVLELVLENFVYPWYRDVTDDES FV DELRITLRFFASVLIRRIHKVDIPS IITKLLKAAMKHIEVIV KARQKVKNTEFLQQAAL EYGP ELHVALRSRRDELHYLRKLTE LLFPYILPPKATDCRSLTLLIREILSGSVFLPSLDFLADPDTV NHLLIIFIDDSPPEKATEPASPLVPFLQKFAEPNRNKKPSVLKL ELKQIREQQDLLFRFMNFLKQEGAVHVLHVLFDCGGI
505	1244	2	1116	QSLAEVLQQLGASSELQAVLSYIFPTYGVTPNHSAFSMHALLV NHYMKGGFYPRGVTSEIAFHTIPVIQRAGGAVLT KATVQSVLL DSAGKACGVSVKKGHEL VNIYCPIVVS NAGLFNTYEHLLPGNA RCLPGVKQQLGTVRPG LGMTSVFICLRGT KEDLHLPSTNYVY YDTMDQAMERYVSM PREEAAEH IPLLFFAFPSAKDPTWEDRF PGRSTMIMLIPTAYEWFE EWQAE LKGK \RGS DYETFKNSFVEA SMSVVLKLF PQLEGKVESVTAGSPLTNQFY L \AAPRGACYGAD HDLGR LHPCVMAS LRAQSP IPNL YLTGQDIFT CGLV GALQ GAL LCSSTILKRNL YSDLKNLDSRIRAQKKKN
506	1245	1759	873	RPQETRVLQVSCGRAHSLVLT DREGVFSMGNN SYGQCGRKVVE NEIYSESHRVHRMQDFDQGVVQVACGQDHS LFLTDKGEVYSCG WGADGQTGLGHYNITSSPTKLG GDLAGVNV IQVATYGDCC LAV SADGGLFGWGNSEYLQLASVTDSTQVNVPRCLHFSGVGKVRQA ACGGTGC AVLNGEGHV FVWGYGILGKGNL VESAVPEMIPPTL FGLTEFNPEIQVSRIRCGLSHFAALTNGELFVWGNIRGCLG IGRLEDQYFPWRVTMPGEPVDVACGVDHMTLAKSFI

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507	1246	520	2	LPFREWLMIVVLSAAAVAAAFMAKCRMVLSRRYFCSHFVMSA SRARIRSSFRTSSRRAGALYSGMLAGWPFPCFWVLSASSSL SSQVRSLSRISCSRFSHADCSWVRACCSFSTFYACFSRNSSS SLMTLAWALLKAWSRISMCLRWSLAVRTAANSISNFSFSFKN
508	1247	1	1083	MQAVRATASQSLSCARAPREPTQHALRAHWFPAAAVQPSPHS GVAAAAGTWSSAFRGEHPLVSSGLLLGVREQSFRLLRSKAGTH MYLEHTSHCPHHDDDTAMDTPLPRPRPLLAVERTGQRPLWAPS LELPKPDMPQPLPAGAFLEEEVAEGTPAQTESEPKVLDPEEDLLC IAKTFSYLRESGWYWSITASEARQHLQKMPEGTFILVRDSTHP SYLFTLSVKTTTRGPTNVRIEYADSSFRLDSNCLSRPRILAFPD VVS LVQHYVASCTADTRSDSPDPAPTALPMPKEDAPSDPALP APPPATAVHLKLVQPFVRRSSARS LQHLCLRLVINRLVADVDC PLPRRMADYLRQYPPQL
509	1248	2	841	FVDIFQRWKECRGKSPAQAELSYLNKAKWLEMYGVD MHVVRGR DGCEYSLGLTPTGILIFEGANKIGLFFWPKITKMDFKKSKLTL VVVEDDDQGREQHTFVFRLDSARTCKHLWKCAVEHHAFFRLR TPGNSKSNRSDFIRLGSFRFRSGRTEYQATHGSRRLRTSTFER KPSKRYPSRRHSTFKASNPEVIAAQLCSKTNPVHNYQPQYHPN IHPSQPRWHPHSPNV RPSFQDDRS HWKASASGDDSHFDYVHDQ NQKNLGGMQSMYRDKLMTAL
510	1249	2	763	GGIRLIQKLTWRSRQDRENCAMKGKHKDECHNFIKVFVPRND EMVFCVGTNAFNP MCRYRVSIFYVICFF*STFLPSLICC*S* NLSAFQ*FVLSLVQ*KNKDRILQMEF*YK*NSIAFKRAR*IDM TLAIYFSFV\LSTL*YDGEIISGLARCPFDARQTNGALFADGK LYSATVADFLASDAVIYRSMGDGSALRTIKYDSKWIKE/PHFL YAIK/Y/GNYVYFSFREIVAT**LG/KA VDS/RVARYEKQLVG PTV
511	1250	1555	629	ARALARERESESARADDVTLGVSAILA VDRGGNLGSA\DGWAY IDVEVRRPWAFVGP GCSRSSGNGSTAYGLVGS PRWLS PFHTGG AVSLPRRPRGPV LGVARPCLRCVLRPE\HYEPGSHYSGFAG RDASRAFVTGDCSEAGLVDDVSDLSAAEMLTLHNWLSFYEKNY VCVGRVTGRFYGEDGLPTPAL TQVEAAITRGLEANKLQLQEKQ TFPPCNAEWSSARGSRLWCSQKSGGVSRDWIGVPRKLYKPGAK EPRCVCVRTTGPPSGQMPDNPPHRNRGDL DHPNLAEYTGCPPL AITCSFPL
512	1251	1100	798	YFIICRDGVLLFCPGWSQTPGAQA ILLHWATQNAGMTDMSHSA QPIYLFYILIRTRSHYVAQAGQLLDSNDSPNVASQNVGITGMS HHAWLKIVLYFCII

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513	1252	3	1395	PAARPPSLVRLSPSPPKPRARARAPQSVPAAPLVARGSSPPA RPAPAMVRPRRAPPYRSGAGGPLGGRGRPPRPLVVRVRSR ASPRGPQPPR\IRARSAPPMEGARVFGALGPIGPSSPGLTLGG LAVSEHRLSNKLLAWSGVLEWQEKRRPYSDSTAKLKRTLPCQA YVNQGENLETDQWPQKLIMQLIPQQLLTTLGFLFRNSQLAQFH FTNRDCDSLKGLCRIMGNGFAGCMLFPHISPCEVRLMLLYSS KKKIFMGLIPYDQSGFVSAIRQVITTRKQAVGPGGVNSGPVQI VNNKFLAWSGVMEWQEPPEPNSRSKRWLPSHVYVNQGEILRT EQWPRKLYMQLIPQQLLTTLVPLFRNSRLVQFHFTKDLTLKS LCRIMDNNGFAGCVHFSYKASCEIRVLMMLLYSSEKKIFIGLIPH DQGNFVNGIRRVIANQQQVLQRNLEQEQQQRGMGG
514	1253	320	964	GRPALGREAPPQAGLSSTPPPCSETCTMGPHSILRTVHCRPTK TPPEPSAEPHPLSLLTSSNTSLAGTSLGRDLTPGGGKPPSGQT PRNPESPRHRLGSPRGRRLASPTPTGSGRSGPASRGQRRLSC AAQDPTSEGASVGAMEAGLGPPTAAPRGVVSEAAESLGTLWSW GAWGRPPAGPSGLAGRRSRREALRPDRKEASVMMAAVSAIQP
515	1254	704	107	PGVPTHGWPRSRVLTRVGRSGSGKMAAAVLAAGLRAARRAV AATGVRGGQVRGAAGVTDGNEVAKAQATPGGAAPTIFSRILD KSLPADILYEDQQCLVFRDVAPQAPVHFLVIPKKPIPRISQAE EEDQQ/LTYVPPLSL*LLGHLLLVAKQTAKAEGLDGYRLVIN DGKLGAAQSVYHLHIHVLGGRQLQWPPG
516	1255	2299	924	VPNYLPVSVAIGGEVPPQRYVWRFCIGLHSAPRFLVAFAYWNH YLSCTSPCSCYRPLCLNFGNLNVENLALLVLTYSSESDF/T WVPG*GRSGEVFPEGTLPLPHSDLPTSWCGHSLQCGSQSSFP PAIHENAFIVFIASSLGHMLLTICILWRLTKKHTVSQE\DGLSL AGAPRQPRRKSRTSVLRIRVMVRWELSSNGNPGRGVLGLGLGL GNKLRVVGQNLGL*HCVVWVWETGE*KRWRLQMGIE*GVASRR Q*VRNSVRGLVCHNSSAPPMYMGFFSPTVFGGGVGG*LHVTFI LHPPEVEAAGIPLLLGPSLPQRQGREHIVVILAAPACAPFHDR *WEPREIRPSP*ELGLRGEPTLSYPASCRVIRQPI*DRKSYS WKQRLFIINFISFFSALAVYFRHMYCEAGVYTIFAILEYTVV LTNMAFHMTAWWDFGNKELLITSQPEEKRF
517	1256	3	254	IDLLEIRNGPRSHESFQEMDLNDDWKLKDEVKAYLKKEFEKH GAVVNESHHDALVEDIFDKEDEDKDGFISAREFTYKHDEL
518	1257	2	611	PRVGRGVGKEGAAAKPRSLRLRFQLLSWSVCGGNKDPWVQELM SCLDLKECGHAYSIVAHQKHLLPTSPPISQASEGASSDIHTP AQMLLSLTLQSTQRPPLPVGSLSSDKELTRPNETTIHTAGHSLA AGPEAGENQKQPEKNAGPTARTSATVPVLCLLAIFILTAALS YVLCKRRRGQSPQSSPDLPVHYIPVAPDSNT
519	1258	1002	418	LIISNFLKAKQKPGSTPNLQQKKSQARLAPDIVSASQYRKFE FQTGILIIYELLHQPNPFVRAQLRERDQEDLPPLPALSLYS PGLQQLAHLLEADPIKIRIRIGEAKRVLQCLLWGPRLRELVQQP GTSEALCGTLHNWIDMKRALMMMKFAEKAVDRRRGVELEDWL CCQYLASAEPGALLQSLKLLQLL



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520	1259	2	2019	KRGLIVVMAHEMIGTQIVTERGVALLESSTGTEKVLLIDSRPFVE YNTSHILEAININCSKLMKRRLQQDKVLITELIQHSAKHKVDI DCSQKVVVYDQSSQDVASLSSDCFLTIVLLGKLEKSFNSVHLLA GGFAEFSRCFPGLCEGKSTLVPTCISQPCLPVANIGPTRILPN LYLGCQRDVLNKLMLQQNGIGYVLNASNTCPKPDFIPESHFLR VPVNDSECEKILPWLDKSVDFIEKAKASNGCVLHVCLAGISRS ATTIAIAYIMKRMDMSLDEAYRFVKEKRPTISPNNFLGQLLDY EKKIKNQGTGASGPKSKLKLHLEKPNPVPVAVSEGGQKSETPL SPPCADSATSEAGQRPVHPASVPSVPSVQPSLLEDSPLVQAL SGLHLSADRLEDNKLKRSFSLDIKSVSYASMAASLHGFSSS EDALEYYKPSTTLDGTNKLKQFSPVQEL/CGADSRNQSS**GGS Q/PSPRSCRPPGLQTARASDCIRSEPAAVAPPRGPFYLCIEV GAWRTITTPASFSAFPP\PAAPHEVCWPGP*GLA\PDILAPQT STPSLTSSWYFATESSHFYASAIYGGSASYSAYSQSCQLPTCG DQVYSVRRRQKPSDRADSRRSWHEESPFKQFRRRCQMEFGE SIMSENRSREELGKVGSGSSSFGSMEIIEVS
521	1260	20	803	ASSSKRVSRRQKMLQLWKLVLGCGVLTGTSESLLDNLGNDLSNV VDKLEPVLHEGLETVDNTLKGILEKLVLDGLVQKSSAWQLAK QKAQEAELNNVISKLLPTNTDIFGLKISNLSLIDVKAEPID DGKGLNLSFPVTANVTEAGPIIDQIIN\LRASLDLLTAVTIET DPQTHHPVAGLGEACARDPTSISLCLLDKHSQIINKFVNSVINT LKSTVSSLLQKEICPLIRIFIHSLDVNVIQQVVDNPNQHKTLQ TLI
522	1261	1246	411	CSLRRRPRSAEPDADHVPLLGLLRLQLRAARQPGAMRPQGPAA SPQRLRGLLLLLLLLQLPAPSSASEIPKQKQKQALRQREVVDLY NGMCLOGPAGVPGRDGSPGANGIPGTPGIPGRDGFKEKGECL RESFEESWTPNYKQCSWSSLNYGIDLKIAECTFTKMRSNSAL RVLFSGSLRLKCRNACCQRWYFTFNGAECSGPLPIEAIYLDQ GSPENNSTINIHRSSVEGLCEGIGAGLVDAIWWGTCSDYPK GDASTGWNVSRIIEELPK
523	1262	2009	921	MHSAMLGTRVNLVSDFWRVMMRVCWLVRQDSRHQRIRLPHLE AVVIGRGPETKITDKKCSRQQVQLKAECKGYVKVQVGVNPT SIDSVVIGKDQEVKLQPGQVLHVMNELYPYIVFEFEEAKNPGL ETHRKRRSGNSDSIERDAAQEAAGTGLEPGSNSGQCSVPLK KGKDAPIKKESLGHSWQGLKISMQDPKMQVYKDEQVVVKDKY PKARYHWLVLPWTSISSLKAVAR\EHLELLKHMHTVGEKVVD FAGSSKLRFRLGYHAIPSMHVHLHVISQDFDSPCLKNKKHWN SFNTEYFLESQAVIEMVQEAGRVTVRDGMPELLKPLRCHCCQ QLLPSIPQLKEHLRKHWTQ

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524	1263	2067	198	DMSDTSESGAGLTRFQAEASEKDSSSMQTLTQNVETPKASKALEVSEDEVKVKASGVSKATEVSKTPEAREAPATQASS TTQLTDTQVLAAENKSLAADTKKQNADPQAVTMPATETKKVSH VADTKVNTKAQETEAAPSQAPADEPEPESAAAQSQENQDTRPK VKAKKARKVKHLDGEEDGSSDQSQASGTTGGRRVSKALMASMA RRASRGPIAFWARRASRTLACFGPGEPLSPWRSP\KARRQR GFAVRVAKFQ\SSQEPPEAPPW\DVALLQGRAN\DLVKYLLAK DQTKIPIKRS\DMKDIKEYTDVYPEII\ERAGYSLE\KVFG IQLKEIDKNDHLYILLSTLEPTDAGILGTTKDSPKLGLLMVLL SIIF\MNGNRS\SEAVIWEVLR/RSGLRLGIHHS\LLGDVK\ KLITDEV\VKQKYL\DYARVPHSNP\EYEFFWG\LRSYEDQ QR*KSEFKFACK\VQK\KDPK\EWAAQSPPGKAR/ERMEAD\LK AAS*GSPWKPRRLRAEIKARMGIGLGSENAAGPCNWDEADIGPW AKARIQAGAEAKAKAQESGASTGASTSTNNSASASASTSGGF SAGASLTATLTFGLFAGLGAGASTSGSSGACGFSYK
525	1264	1	1397	ARPPVCTGSTMSLTVVSMACVGFFLLQGAWPLMGQDKPFLSA RPSTVVPRGGHVALQCHYRRGFNNFMYKEDRSHVPIFHGRIF QESFIMGVPTPAHAGTYRCRGSRPHTGWSAPSNPLVIMVTG NHRKPSLLAHPGPLLKSGETVILQCWSDIMFEHFFLHKEGISK DPSRLVGQIHDGVSKANFSIGPMMLALAGTYRCYGSVTHTPYQ LSAPSDPLDIVVTGPYEKPSLSAQPGPKVQAGESVTLSCSSRS SYDMYHLSREGGAHERRLPVAVRKVNRTFQADFPLGPATHGGTY RCFGSFRHSPYEWSDPSDPLLVSVTGNPSSSWPSPTEPSSKSG NLRHLHLILIGTSVVKIPFTILLFLLHRWCSNKK\NAAVMDQE PAGNR\VNSEDSDEQDHQEVSY*LEHCVFTQRKITRPSQRPK TPPTDTSMYIELPNAEPRSKVVFPCPRAPQSGLEGIF

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526	1265	6657	988	<p>LHNLREYFSGLIYTYSGLFCVVVNPYKHLPIYSEKIVDMYKG  KKRHEMPPHIYAIADTAYRSMQLQDREDQSILCTGESGAGKTEN  TKKVIQYLAVVASSHKGKKDTSITGELEKQLQANPILEAFGN  AKTVKNDNSSRFGKFIRINFDVTGYIVGANIETYLLEKSRIR  QARDERTFHFIFYMIAGAKEKMRSDLLLEGFNNTFLSNGFVP  IPAAQDDMFQETVEAMAIMGFSEEEQLSILKVSSVLQLGNI  VFKKERNTDQASMPDNTAAQKVCHLMGINVTDFTRSILTPRIK  VGRDVVQKAQTKEQADFAVEALAKATYERLFRWILTRVNKALD  KTHRQASFLGILDIAGFEIFEVNSFEQLCINYTNEKQLQFLN  HTMFIL\EQEYQREGIEWNFIDFGLDLQPCIELIERPNPPG  VLALLDEECWFPKATDKSFVEKLCTEQGSHPKFKQPKQLKDKT  EFSIIHYAGKVDYNASAWLTKNMDPLNDNVTSLNASSDKFVA  DLWKDVDRIVGLDQMAKMTESLPSASKTKGMFRTVGLYKE  QLGKLMTTLRNTTPNFVRCIIPNHEKRSGLDAFLVLEQLRCN  GVLEGIRICRQGFNRIVFQEFQRQYEILAANAIPKGFMDGKQ  ACILMIKALELDPNLYRIGQSKIFFRTGVLAHLEERDLKITD  VIMAFQAMCRGYLARKAFARQQQLTAMKVIQRNCAAYIKLRN  WQWCRLFTKV*PLLQVTRQE*EMQAKEDELQTKERQQKAENE  LKELEQKHSQQLTEKNLLQEQLQAETELYAEAEEMRVRLAACK  QELEEILHEMEARLEEEEDRGQQLQAERKKMAQQMLDLEEQL  EEEEARQKLQLEKVTAEAKIKKLEDEILVMDQNNKLSKERKL  LEERISDLTTLNLAEEEEKAKNLTKLKNKHESMI SELEVRLKKE  EKSRQELEKLRKLEGDASDFHEQIADLQAQIAELKMQLAKE  EELQAALARLDDEIAQKNNAKKIRELEGHISDLQEDLDSERA  ARNKAQKQKRDLEELKALTELEDTLDSSTATQQLRAKREQE  VTVLKR\ALNEETRSHQAQVQEMRQKHAQAVQSLTEQLEQ\*K  RAKANLDKNQKQTKLEKENTD\LAGELRVLGQA\KQEVHRMCKL  QAQVQELQSKSDGERARAEINDKVHK\LQNEVESVTG\MLNE  AEGKAIKLAKDVASLSSQL\QDTQELLQEESSRQKLNVT\SLR  \QLEEEERNLQDQLDEEMEAQNLERHISTLNIQLSDSKKKLQ  DFASTVEALEEGKKRFQKBIENLTQQYEEKAAAYDKLEKTKNR  LQQELDDLVDLDNQRQLVSNLEKKQRKFDQLLAEENISSKY  ADERDRVEAEAREKETKALSL\ARALEEAEAKEELERTNKML  KA\EMGRPGSASKD\DVQELSHDL\EKSK\RALGDPRLEEMK  T\QLEELGRTELASPRDA\KLRLEVNMQAPSRASFER\DLQA  RTEQNE\ESRR\HLQRQLHEYETELEDERKQRALAAAKIKLG  WDPVRTLDL*ADSAIKGRGGKAQKLRKLQAQMKDFQRELEDA  \RASRDEIF\ATA\KENEKKAKSLEA\DLMLQLE\DLAAEEG  RKQ\ADLE\KEELAEEL\ASSLSGRNALQDEKRRLERIAQLE  EELEEEQGNMEAMSDRVKATQQAQQLSNELATERSTAQNES  ARQQLERQNKELRSKLHEMEGAVKSKFKSTIAALEAKIAQLEE  QVEQEAQKQATKSLKQKDKKLKEILLQVEDERKMAEQYKEQ  AEKGNARVKQLKRQLEEAEEESQRINANRRKLQRELDEATESN  EAMGREVNALKSKLRRGNETSFVPSRRSGGRRVIENADGSEEE  TDTRDADFNKTKASE</p>

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527	1266	1	775	KLHFAKSLNSELS CSTREAMQDEGYITLNIKTRKPALVSVGP ASSSWVRVMALILLILCVGMVGLVALGIWSVMQRNYLQDENE NRTGTLQQLAKRFCQYVVKQSELKGTFGHKCSPCDTNWRYYG DSCYGFRRHNLTWEEKQYCTDMNATLLKIDNRNIVEYIKAR\ THLIRWVGLSRQKSNEVWKWEDGSVISENMFEFLEDGKGNMNC AYFHNGKMHPTFCENKHYL\MCE\RKAGHDPRTWLPLMPKRW TG
528	1267	1053	424	NQGLRDVGLCRTCLVNKIFASSILGKSHHSLVSINQGHNA PW KAAGS\LPLKAAAYC\QGFSPCDCLKYG\SWDEKDLMPVQPDTH KGSVLRWISKRGKPLAVEMEEGHCL\CLPLGTECLGVKP\IVH LFNSEMGEK\RPVAG\ARHVGSSAALLFFTPLRCLGGEKHKSG LRARPGIVPSLELNYDIDSFAHMF/SVDLLLIITLLSYIPIFC
529	1268	1435	1560	MWWRLLAPTQAIWRAAGCCMRFSRRRSTCCCLASCIFLLYKIVR GDQPAAKRRQRRRRAAPSAPPQAARLHPPPKLRRFDGVQDPAP YSWAINGKVFDVTQRPANFLRGPRGPETLSDWESQFTFKYHHV GKLLKEGEEPTVYSDEEPEKDESARKND*
530	1269	705	166	GPRMAKFLSQDQINEYKECFSLYDKQQRGKIKATDLMVAMRCL GASPTPGEVQRHLQTHGIDNGELDFSTFLTIMHMQIKQEDPK KEILLAMLMDVDEKKGVMASDLRSKLTSLGEKLTHKEV\DDL FRE\ADIEPNGKVKYDEFIHKI/TLLPGRDLLKEENGRASPGP ENLEQLIFL
531	1270	25	1396	ADPHTTVIRFFPAASATKRVLPVLRVSSPRTWNPVNPESPRI PAPRLPKRMMSGAPTAGAALMLCAATAVLLSAQGGPVQSKSPRF ASWDEMNVLAHGLLQLGQGLREHAERTSRLSALERRLSACGS ACQGTGSTDLPLAPESRVDPEVLHSLQTQLKAQNSRIQQLFH KVAQQQRHLEKQHLRIQHLQSQFGLLDHKHLDHEVAKPARRKR LPEMAQPVDPAHNVSRHLRLPRDCQELFQVGERQSGLFBIQPPQ GSPPFLVNCKMTSDGGWTVIQRHDGSDVDFNRPWEAYKAGFGD PHGEFWLGLKLVHSITGDRNSRLAVQLRDWDGNAELLQFSVHL GGEDTAYSLQLTAPVAGQLGATTVPVPSGLSVPFSTWDQDHLR RDKNCAKSLSGWWFGTCSHSNLNGQYFRSIPQQRQKLKKGIF WKTWRGRYYPLOATTMLIQPMAAEAAS
532	1271	1276	90	ALDFGDSQCWPRPQDTMKQLPVLEPGDKPRKATWYTLTVPGDS PCARVGHSCSYLPPVGNARGKVFIVGGANPNRSFSDVHTMDL GKHQWDLDTCKGLLPRIYEHASFIPSCPTDRIWVFGGANQSGNR NCLQVLNPETRTWTTEVTSPPPSPTFTHTSSAAIGNQLYVFG GGERGAQPVQDTKLHVFDANTLTWSQPETLGNPPSPRHGMV AAGTKLFIHGGLAGDRFYDDLHCIDISDMKWQKLNPTGAA\PA GCAS/HTPAVAMGK\HVYI\FGGMTAPAGPGTQCTQYHTEEQH WDPCLKF\DTPSYPPGTIGTHSHVVSFPW\PVTCASEKEDS\N SLTLNHEAEKEDSADKVMSSHSGDSHEESQTATLLCLVFGGMNT EGEIYDDCIVTVVD

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533	1272	1169	639	GFSIGKATDRMDAFRKAKNRAVHHLHYIERYEDHTIFHDISLR FKRTHIKMKKQPKGYGLRCHRAIITICRLIGIKDMYAKVSGSI NMLSLTQGLFRGLSRQETHQQLADKKGLHVVEIREECGPLPIV VASPRGPLRKDPEPEDEVPDVKLDWEDVKTAQGMKRSVWSNLK RAAT
534	1273	25	1396	ADPHTTVIRFFPAASATKRVLPVLRVSSPRTWNPVPESPRI PAPRLPKRMMSGAPTAGAALMLCAATAVLLSAQGGPVQSKSPRF ASWDEMNVLAHGLLQLGQGLREHAERTRSQLSALERRLSACGS ACQGTEGSTDLPLAPESRVDPEVLHSLQTQLKAQNSRIQQLFH KVAQQQRHLEKQHLRIQHLSQFGLLDHKHLDHEVAKPARRKR LPEMAQVPDPAHNVSRHLRLPRDCQELFQVGERQSGLFETQPQ GSPFFLVNCKMTSDGGWTVIQRRHDGSVDFNRPWEAYKAGFGD PHGEFWLGLKVVHSITGDRNSRLAVQLRDWDGNAELLQFSVHL GGEDTAYSLQLTAPVAGQLGATTVPVPSGLSVFFSTWDQDHLR RDKNCAKSLSGGWVFGTCSHNLNGQYFRSIPQQRQKLKKGIF WKTWRGRYYPLQATTMLIQPMAAEAAS
535	1274	23	1102	TLRSRPAGEAGYLGWDPEQAGEGSALSRLPGAMAALMTPGTGAP PAPGDFSGEGSQGLPDPSPEPKQLPELIRMKRDGGRLSEADIR GFVAADVNGSAQGAQIGAWGGLGVPDPDWEVSPRDFGSLGVRR CPTTSTGPRVPHRCGLPPSRVPPHTRG\MLMAIRLRGMDLEET SVLTQALAQSGQLEWPEAWRQQLVDKHSTGGVGDKVSLVLAP ALAACGCKVINHLLSRREPIPHMQQPVHPQAAPNLKPGPKPPR PYQGFSPPCSPAQFSPPRSPAQRLGPLWLQTRPLGAGKRSTDG IQTPFPLGPQTAPPREELRTSLPLPQALFPQGVPTSSPTDTS QPRKLPFHSLTSWAPL
536	1275	3	439	RAIRELRERVTHGLAEAGRDREDVSTELYRALEAVRLQNSEGS CEPCPTSWLPFGGSCYYFSVPKTTWAEAQGHCADASAHLA/IV GGLGEQDFLSRDTSLEYWIGRRVQHLRKVQGYSWVDGVPLS FR*/WEG/HPGETWGPQVRL
537	1276	1	564	RWPRSWPPRAGAARGAAEAMVGALCGCWFRLLGGARPLIPLGP TVVQTSMSRSQVALLGLSLLLMLLLYVGLPGPPEQTSCLWGDP NVTVLAGLTPGNSPIFYREVLPNQAHRVEV\CCFMERPLTLT RGSSWAHCSYCHRGATGPWPLTFQVLGTRHLQRRQAQRQGGQR CWSGRCGTWRYRMPWC

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538	1277	102	1549	QENQLEKKMKFLIFAFFGGVHLLSLCSGKAICKNGISKRTFEE IKEEIASCGDVAKAIINLAVYGKAQNRSYERLALLVDTVGPRL SGSKNLEKAIQIMYQNLQQDGLEKVHLEPVRI PHWERGEESAV MLEPRIHKIAILGLGSSIGTPPEGITAEVLVVTSTFDELQRRAS EARGKIVVYNQPYINYSTRVQYRTQGAVEAAKVGALASLIRSV ASFISIYSPHTGIEYQDGVPKIPTACITVEDAEMMSRMASHGI KIVIQLKMGAKTYPDTDSFNTVAEITGSKYPEQVVLVSGHLD WDVGQGAMDDGGGAFISWEALSLIKDLGLRPKRTLRLVLWTAE EQGGVGAFQYYQLHKVNIISNYSILVMESDAGTFLPTGLQFTGSE KARAIMEEVMSLLQPLNITQVLSHGEGTDINFWIQAGVPGASL LDDLYKYFFHHSHGDTMTVHGIQTQMNVA\AAAV\WAVSVYV\ VADMEEMPLPRS
539	1278	2438	1148	TKPRKRRHQPASQRQRPWSSDSTGDLARGKGRKEENKGS DRV SLAPPSLRRPMMCQSEARQGP ELRAAKWLHFPQLALRRRLGQL SCMSRPALKLRWPLTLVLYLLPFGALRPLSRVGWRPVSRVAL YKSVPTRLLSRAWGRLNQVELPHWLRRPVYSLYIWTFGVNMKE AAVEDLHHYRNLSEFFRRKLKPQARPVCGLHSVISP SDGRILN FGQVKNCVEVEQVKGVTSLESFLGPRMCTEDLPFPAAACDSF KNQLVTREGNELYHCVIYLAPGDYHCFHSPTDWTVSHRRHFP SLMSVNPGMARWIKELFCHNERVLTGDWKHGFSLTAVGAT\ NWGSIIRIYFDRDLHTNSPRHSGSYNDFSFTHTNREGVPMRK GEHLGEFNLGSTIVLIFEAPKDFNFQLKTGQKI\RFGEALGSL
540	1279	3	1911	LPERAFGPRTTPRAPRRRRRRLLSPPPRPPPLDREPRAPGPW LCPSRAGTAQDPAIRERRGRVAGGAAGPAMELRARGWLLCA AAALVACARGDPASKRSRSCGEVRQIYGAKEFSSS\DVQAEIS GEHLRICPQGYTCCTSEMEENLANRSHAELETALRDSRVLQA MLATQLRSFDDHFQHLNDSERTLQATFPGAFGELYTQNAFA RDLYSELRLYYRGANLHLEETLAEFWARLLERLFKQLHPQLLL PDDYLDCLGKQAEALRPF\GEAP\RELRLRAT\RA\FVAAR\S FVQGLGVAS\DVVRKVAQVPLG\PEC\SRAVIEAGSYC\ALHC VGVPGARPCPDYCRNVLKGCLANQADLDAEWRNLLDSMVLITD KFWGTSGVESVIGSVHTWLAEAINALQDNRDTLTAKVIQCGCN PKVNPQGGPPEEKRRRGKLAPRERPPSGTLEKLVSEAKAQLRD VQDFWISLPGTLCSEKMALSTASDDRCWNGMARGRYLPEVMGD GLANQINNPEVEVDITKPDMTIRQQIMQLKIMTNRLRSAYNGN DVDFQDASDDGSGSGSGDGCLDDLCGRKVSRSKSSSRTPLTHA LPGLSEQEGQKTSAA SCPQPPTFLLPLLLFLALTVARPRWR
541	1280	590	189	ATELTRAGMEASALT KSA\VTSAKVVR\VASGSVVLP LARI ATSCD*RVGGP/VQAVPMVL\SAMGLQLRAGIASSSIAAKMMS AAAIA\NGGGVSPGQPLWLLQLSLGATGL\SGLTKFILGSIGS AIA\AVIARFY

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542	1281	41	1415	TNGRNLLHHWILGVCGMHPHQETLKKNRVVLAKQLLLSELLE HLEKDIITLEMRELIQAKVGSFSONVELNLLPKRGPOAFDA FCEALRETKQGHLEDMLLTTLSGLQHVLPPLSCDYDLSLPFPV CESCPYKKLRLSTDTVEHSLDNKDGVPCLQVKPCTPEFYQTH FQLAYRLQSRPRGLALVLSNVHFTGEKELEFRSGGDVDHSTLV TLFKLLGYDVHVLCDQTAQEMQEKLNFAQLPAHRVTDSCIVA LLSHGVEGAIYGVGDKLLQLQEVFQLFDNANCPSLQNKPKMFF IQACRGGAGISLGHLLLFTAATASLAL\ETDRGVDQQDGKNHA GSPGCEESDAGKEKLPKMRLPTRSDMICGYACLKGTAAAMRNTK RGSWYIEALAQVFSEACDMHVADMLVKVNALIKDREGYAPGT EFHRCKEMSEYCSLTCRHLYLFPGHPPT
543	1282	862	275	VRGKEVMAALCRTRAVAAESHFLRVFLFFRPFRGVGTESGSES GSSNAKEPKTRAGGFASALERHSELLQKVEPLQKGSPPKNVESF ASMLRHSPLTQMGPADKLVIGRIFHIVENDL\YIDFGGKFHC VCCRPEVDGEKY\QKGTRVR\LRLDLELTSRFLGATTD\TTV LEANAVLLGIQESKDSRSKEEHLEKYI

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544	1283	2	4503	<p>IPGASAPARRAAPLRRLGLRLASGWARAPGGVSPVPGPMGGDA PTMARAQALVLELTFQLCAPETETPEVGCTFEEGSDPAVPCEY SQAQYDDFQWEQVRIHPGTRAPADLPHGSYLMVNTSQHAPGQR AHVIFQSLSENDTHCVQFSYFLYSRDGHSPTGLGVYVRVNGGP LGSAVWNMTGSHGRQWHQAEALAVSTFWPNEYQVLFEALISPDR RGYMGLDDILLLSYPCAKAPHFSRLGDVEVNAGQNASFQCMMA GRAAEAERFLLQRQSGALVPAAGVRHISHRRFLATFPLAAVSR AEQDLYRCVSQAPRGRGTSINFAEFMV/KEPPTPIAPPQLLRA GPTYLIIQLNTNSIIGDGPIVRKEIEYRMARGPWAHVHVSLO TYKLWHLDPDTEYEISVLLTRPGDGGTGRPGPPLISRTKCAEP MRAPKGLAFAEIQARQLTLQWEPLGYNVTRCHTYTVSLCYHYT LGSSHNQTI\RECVKTEQGVSRYTMTKNLLPYRNVHVRVLVLTNP EGRKEGKEVTFQTDDEVPSGIAAESLTFTPLEDMIFLKWEEPQ EPNGLITQYEISYQSISSSDPAVNVPGPRRTISKLRNETYHVF SNLHPGTTYLFSVRARTGKGFGQAALTEITTNISAPSFYADM PSPLGESENTITVLLRPAQGRGAPISVYQVIVEEEEQGSRRRLRR EPGGQDCFPVPLTFEALARGLVDFYGAELAASSLPEAMPFTV GDNKTYRGFWNPPEPRKAYLIYFQAASHLKGETRLNCIRIAR KAACKESKRPLEVSQRSEEMGLILGICAGGLAVLILLGAIIV IIRKGRDHYAYSYPKPVNMTKATVNYRQEKTHMMSAVDRSFT DQSTLQEDERLGLSFMDTHGYSTRGDQRSGGVTEASSLLGGSP RRPCGRKGSYPYHTGQLHPAVRVADLLQHINQMKTAEYGFQKE YESFFEGWDATKKKDKVKGSRQEPMPAYDRHRVKLHPMLGDPN ADYINANYIDIRINREGYHRSNHFIATQGPKEPMVYDFWRMVW QEHCSIVMITKLVEVGRVKCSRYWPEDSDTYGDIKIMLVKTE TLAEYVVRTFALERRGYSARHEVRQHFHTAWPEHGVYPYHATGL LAFIRRVKASTPPDAGPIVIHCSAGTGRTGCYITVLDVMDMAE CEGVVDIYNCVKTLCSRRVNMIQTEEQYIFIHDAILEACLCGE TTIPVSEFKATYKEMIRIDPOSNSQLREEFQTLNSVTPPLDV EECSIALLPNRDNKRSMDVLPDRCLPFLISTDGDSSNNYINA ALTDSYTRSAAFIIVTLHPLQSTTPDFWGLVDYDGCTSIVMLNQ LNQNSAWPCLQYWPEPGRQQYGLMEVEFMSGTADEDLVARVF RVQNISRLQEGHLLVRHFQFLRWSAYRDTPDSSKAFLLHLLAEG DKWQAESGDGRTIVHCLNGGGRSGTFCA\CATVLEMIRCHNLV DVFFAAKTLRNYKPNMVE*MDQYHFCYDVALEYLEGLBSR</p>



SEQ ID NO: of Nucleic Acids	SEQ ID NO: of Amino Acids	Predicted beginning nucleotide location corresponding to first amino acid residue of amino acid sequence	Predicted end nucleotide location corresponding to first amino acid residue of amino acid sequence	Amino acid segment containing signal peptide (A=Alanine, C=Cysteine, D=Aspartic Acid, E= Glutamic Acid, F=Phenylalanine, G=Glycine, H=Histidine, I=Isoleucine, K=Lysine, L=Leucine, M=Methionine, N=Asparagine, P=Proline, Q=Glutamine, R=Arginine, S=Serine, T=Threonine, V=Valine, W=Tryptophan, Y=Tyrosine, X=Unknown, *=Stop Codon, /=possible nucleotide deletion, \=possible nucleotide insertion)
545	1284	2443	1152	TKPRKRRHQPASQRQRPWSSDSTGDLARGKGRKEENKGS DRV SLAPPSLRRPMMCQSEARQGPPELRAAKWLHFPQLALRRRLGQL SCMSRPALKLRSWPLTVLYLLPFGALRPLSRVGRWPVSRVAL YKSVPTRLLSRAWGRLNQVELPHWLRRPVYSLYIWTFGVNMKE AAVEDLHHYRNLSEFFRRKLKPQARPVCGLHSVISPSDGRILN FGQVKNCVEQVKGVITYSLESFLGPRMCTEDLPFPPAASCD SF KNQLVTREGNELYHCVIYLAPGDYHCFHSPTDWTVSHRRHFP G SLMSVNPGBMARWIKELFCHNERVVLTGDWKHGFFSLTAVGAT\ NWGSIRIYFDRDLHTNSPRHSKGSYNDFS FVTHTNREGVPMAL RGEHLG/QSFNLGSTIVLIFEAPKDFNFQLKTGQKIRFGEALG SL
546	1285	185	3057	AELGLFGSLRFSSLLHFPFRRSPASACGPGEGRMERGLPLLC AVLALVLAPAGAFRNDKCGDTIKIESPGYLTSPGYPHSYHPSE KCEWLIQAPDPYQIRIMINFNPFDLEDRCYDYVEVFDGENE NGHFRGKFCGKIAPPPVSSGPFLLFIKFVSDYETHGAGFSIRY EIFKRGPECSQNYTTPSGVIKSPGFPEKYPNSLECTYI\VFAP KMSEIIL\DFESFDLEPDSNPPGGMFCRYDRLEIWDGFPDVG P HIGRYCGQKTPGRIRSSSGILSMVFYTD SAIKEGFSANYSVL QSSVSEDFKCMELGMESGEIHS DQITASSQYSTNWSAERSRL NYPENGWTPGEDSYREWIQVDLGLLR FVTAVGTQGAISKETKK KYYVKTYKIDVSSNGEDWITIKEGNKPVLFQGNTPD VVVAV FPKPLITRFVRIKPATWETGISMRFEVY GCKITDYP CSGMLGM VSGLISDSQITSSNQGDRNWPENIRLVT SRSGWALPPAPHSY INEWLQIDLGEKIVRGII IQGGKHRENKV FMRKFKIGYSNNG SDWKIMIMDDSKRKAKS FEGNNNYDTPELRTFPALSTRFIRIYP ERATHGGLGLRMELLGCEVEAPTAGPTTPNGNLVDECD DDQAN CHSGTGDDFQLTGTTVLATEKPTVIDSTIQSEFPTYGFNCE F GWGSHKTFCHWEHDNHVQLKWSVLTSKTGP IQDHTGDGNFIYS QADENQKGKVARLVSPVVYSQNSAHCMTFWYHMSGSHVGT LRV KLRYQKPEEYDQLVWMAIGHQGDHWKEGRVLLHKS LKLYQVIF EGEIGKGNLGGIAVDDIS INNHISQEDCAKPADLDKKNPEIKI DETGSTPGYE GEGEGDKNISRKPGNV LKTLPIITIIAMSAL GVLLGAVCGVVLVYCACWHNGMSERNLSALENYNFELVDGV KLK KDKLNTQSTYSEA
547	1286	3	521	HEGSALTWASHYQERLNSEQSCLNEWTAMADLES LRPPSAEPG GSVCGGEGGLGGGEGRIMQWGA WWRGERAP*LRGSAPRSSEQEQ MEQAIRAE LWKVL DVSDLESVTSKEIRQALELRLGLPLQ/PVP *LHRQPDAAAGGTAGPSLPHLPPPLPGLRVERSKPGGA AEEQV GL
548	1287	1742	1200	MAALDLRAELDSLVLQLLGDLEELEGKRTVLNARVEEGWLSLA KARYAMGA KSVGPLQYASHMEPQVCLHASEAQEGLQKFVVR A GVHAPEEVGP REAGLRRRKGP TKTPEPESSEAPQDPLNWF GIL VPHSLRQAQASFRDGLQLAADIASLQNRIDWGRS QLRGLQEKL KQLEPGAA*

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549	1288	1	649	HSDVGAATAVLPLLTAVLGVTVVTRRDTEGPGRALVHLTGSP RQKVGTSGREGLPGLGASCAESELERETQEPRSRGRCIFGAAR WRQVPLASPQRPFLLSPGPRHLHRMGLPVSWAPPALWVLGCCAL LLSLWALCTACRRPEDAVAPRKRRARRQARLQGSATAAEAVSA KLSRGPWGWPQGTDPSSPPVPTADPPLLPPQVGHQTARAAP G
550	1289	433	632	LTGPGQRLAGTTEGPRRCRGSSQAPTPTWKLVDTRLCAAAPWL ASRAPGHYSQMLLVN*PCRKDWLVSKWMRTPVCGQSPAMTDRP RSEAGRDHRRAKALPGLIPGSNPNLEACGHQALCSSSVASVQG PWPLLPNASSPPTPGQPQP
551	1290	102	612	KHRLCSLEQLMTLISAAREYEIEFIYAISPGLDITFSNPKEVS TLKRKLDQVSQFGCRSFALLFDDIDHNMCAADKEVFSSFAHAQ VSIITNEIYQLGEPETFLFCPT/EYCI*WLYI*LVFLEYITYK GPWAPFSLHFPPPLVCKSRNLFLEDIFQDPKLEKF*ELINDN
552	1291	269	565	TSALTQGLERIPDQLGYLVLSEGAVLASSGDLENDEQAASATS ELVSTACGFRLHRGMNVFPKRLSVVFGEHTLLVTVSGQRVFFV KRQNRGREPIDV
553	1292	660	233	AKRAERTSRLQGLQHPSPPYPPATLGVTTPGQDRTLQQLQHCPA GRKSRKKKSKATQLSPEDRVEDALPPSKAPSRTRRAKRDLPKR TATQRPEGTSLQDPEAPTVPKKGRRKGRQAASGHCRPRKVK A DIPSLEPEGTSAS
554	1293	590	323	RKSSWLGAVAHACNPSSLGGPGRQITRSGVRDQPGQYGETPSL LKIQTLAGRGGACL*SHILRRLRQKNRLNLGGRGCSELSRHC APA
555	1294	1	242	AWNSARGAVSPLWVPGCFLTSLVTWIGAAPLILSRIVGGWECE KHSQPWQVLVASRGRAVCGGVLVHPQWVLTAHCAIRK
556	1295	1074	230	AEMADDLGDEWWENQPTGAGSSPEASDGEGEEDTEVMQQETVP VPVPSEKTKQPKCEFLIQPKERKENTTKTRKRRKKKITDVLAK SEPKPGLPEDLQKLMKDYSSRRLVIELEELNLPDSCFLKAND LTHSLSSYLKEICPKWVKLRKNHSEKKSVMMLIICSSAVRALE LIRSMTAFRGDGKVIKLFKHKIKVQAQVKLLEKRVVHLGVGTP GRIKELVKQGGLNLSPLKFLVFDWNWRDQKLRRMMDIPEIRKE VFELLEMGVLSLCKSESCLKGLF
557	1296	929	289	RPGTAIWVVECEHGRPIAESEGQEGRGHSPPGPCSVAGFLRGR LGRNLEIMGSTWGS PGWVRLALCLTGLVLSLYALHVKAARARD RDYRALCDVGTAISCSRVFSSRWGRGFLVEHVLGQDSILNQS NSIFGCIFYTLQLLGCLRTRWASVLMLLSSSLVSLAGSVYLA W ILFFVLYDFCIVCITTYAINVSLMWLSFRKVQEPQKAKRH

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558	1297	2	1063	ESPAPPAFRPAMAAVALMPPPLLLLLLLASPPAASAPSARDPF APQLGDTQNCQLRCRDLGPPSQAGLEGASESPYDRAVLIS ACERGCRLFSICRFVARSSKPNATQTECEAACVEAYVKEAEQQ ACSHGCWSQPAAPEPEPEQKRKVL EAPSGALSLLDLFSTLCNDLV NSAQGFVSSWTYYLQTDNGKVVFQQTQPIVESLGFQGGRLQR VEVTWRGSHPEALEVHVDPVGPLDKVRKAKIRVKTSSKAKVES EEPQDNDFLSCMSRRSGLPRWILACCLFLSVLWMLWLSCTLV TAPGQHLKFQPLTLEQHKGFMMEPDWPLYPPPSHACEDSLPPY KLKLDLTKL
559	1298	2	485	FPGLGTSLSAMRFLAATFLLALSTAAQAEPVQFKDCGSVDGV IKEVNVSPCPTQPCQLSKGQSYSVNVTFTSNIQSKSKAVVHG ILMGVPVPFPIPEPDGCKSGINCPIQKDKTYSYLNKLPVKSEY PSIKLVVEWQLQDDKNQSLFCWEIPVQIVSHL
560	1299	1304	919	APETFRCVWRLQGLTFIAFTELQAKVIDTQQKVKLADIQIEQL NRTKKHAHLTDTEIMTLVDETNNMYEGVGRMFILQSKEAHSQL LEKQKIAEEKIKELEQKKSYLERSVKEAEDNIREMLMARRAQ
561	1300	3	799	HSLLLGTRVRDASSKIQQEYTLTLRKGGNNKLSRVFHRDGHYG FSEPLTFCSVVDLINHYRHESLAQYNAKLDTRL LYPVSKYQQV RAGLGAREGSTWLAPGLSFLGRPDQAMHLPSFRHVSP\DQIVK EDSVEAVGAQLKVYHQYQDKSREYDQLYBEYTRTSQELQMKR TAIEAFNETIKIFEEQQTQEKCSKEYLERFRREGN/QTKEMQ RILLNSERLKSRIA\EIHESPHRSWEQQLLVPRASDNKRD/ID KPH*TSLKPD
562	1301	1772	301	AAAAAGRGRSSGRRRRRPGALFASLGVLLGPRPPPGIPRTRA CSMGGVGEPGPREGPAQPGAPLPTFCWEQIRAHDPGDKWLVI ERRVYDISRWAQRHPGGSRLIGHGAEDATDAFRAFHQDLNFV RKFLQPLLI GELAPEEPSQDGPLNAQLVEDFRALHQAEDMKL FDASPTFFAFLGHILAMEVLAWLLIYLLGPGWVPSALAAFIL AISQAQSWCLQHDLGHASIFKKSWWNHVAQKFVMGQLKGFSAH WWNFRHFQHHAKPNI FHKDPDVTVPVFLLGESSVEYGKKRR YLPYNQOHL YFFLIGPPLLT LVNFEEVENLAYMLVCMQWADLLW AASFYARFFLSYLPFYGVPGVLLFFVAVRVLESHWFVWITQMN HIPKEIGHEKHRDWSSQLAATCNVEPSLFTNWFSGHLNFQIE HHLFPRMPRHNSRVAPLVKSLCAKHGLSYEVKPF LTALVDIV RSLKKS GDIWLDAYLHQ
563	1302	424	93	KSRATRLRESAEMTGFLPPASRGTRRSCSRSRKRQTRRRRNP SSFVASCPTLLPFACVPGASPTTLA PPPVLTGPSTDGIPFAL SLQRVFVLPSPQVASLPLGHSRG
564	1303	1	414	IQYRSDLELHSITMKKSGVLFLLGIILLVLIGVQGTTPVVRKGR CSCISTNQGTIHLQSLKDLKQFAPSPSCEKIEIIATLKNVQQT CLNPDSADV KELIKKWEKQVSQKKQKNGKKHQQKKVLRKS QRSRQKKT

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565	1304	7	3007	IPGSTISCRGCCGKWPVQEADPPRAALRGRFPALLTRHCPSR AEKEKRSLLRRCGRPLLVELAGPAGQAVEVLPHFESLKGQEKI PNKMSAFRNHCPLDSVGEITKEDLIQKSLGTCQDCKVQGPNL WACLENRCSYVGCESQVDHSTIHSQETKHYLTVNLTTLRVWC YACSKFVFLDRKLGTPSLPHVRQPHQIQENSVQDFKIPSNTT LKTPLVAVFDDLDIEADEEDELRRAGLTGLKNIGNTCYMNAAAL QALSNCPLLTQFFLDCGGLARTDKKPAICKSYLKLMTLWYKS RPGSVVPTTLFQGIKTVNPTFRGYSQDAQEFRLCLMDLLHEE LKEQVMEVEEDPQTITTEETMEEDKSQSDVDFQSCSCSNSDR AENENGSRCFSEDNNETMLIQDDENNSEMSKDWQKEKMCNKI NKNVNSEGEFDDKDRDSISETVDLNNQETVKVQIHSRASEYITDV HSNDLSTPQILPSNEGVPNRLSASPPKSGNLWPG LAPPHKKAQ SASPKRKKQHKYRSVISDFDGTIISSVQCLTCDRVSVTLET FQDLSLPIPGKEDLAKLHSSSHPTSIVKAGSCGEAYAPQGWIA FFMEYVVKRFVVSVCVPSWFWGPVVTLQDCLAFFARDELKGDNM YSCEKCKKLNRNGVKFCKVQNFPEILCIHLKFRHELMFSTKIS THVSFPLEGLDLQFLAKDSPAQIVTYDLSVICHGHTASSGH YIAYCRNNLNNLWYEFDDQSVEVSESTVQNAEAYVLFYRKSS EEAQKERRRISNLLNIMEPSLLQFYISRQWLNKFKTFEPGPI SNNDFLCIHGGVPPRKAGYIEDLVMLLPQNIWDNLYSRGGGP AVNHLYICHTCQIEAEKIEKRRKTELEIFIRLNRAFQKEDSPA TFYCISMQWFREWESFVKGDGDPGPIDNTKIAVTKCGNVML RQGADSGQISEETWNFLQSIYGGGPEVILRPPVVHVPDILQA EEKIEVETRSL
566	1305	28	450	SPSAAGGLAWVSLALGSGSRGRDHSGSGVGTAMAGALVRKAAD YVRSKDFRDYLMSTHFWGPVANWGLPIAAINDMKKSPEIISGR MTFALCCYSLTFMRFAVKVQPRNWLLFACHATNEVAQLIQGGR LIKHEMTKTASA
567	1306	133	1292	LGSRQAAGTMRGQRSLLLGPARLCLRLLLLLGYRRRCPPLLRG LVQRWRYGKVLRSLLYNSFGGSDTAVDAAFEPVYWLVDNVIR WFGVVVVLVIVLTGSIVAIAYLCVLPLILRTYSVPRLCWHFF YSHWNLILIVFHYQAITTPPGYPPQGRNDIATVSICKKCIYP KPARTHHCSICNRCVLKMDHHC PWLNNCVGHYNHRYFFSFCFF MTLGCVCYCSYGSWDLFREAYAAIEKMKQLDKNKLQAVANQTYH QTPPPTFSFRERMTHKSLVYLWFLCSSVALALGALT VWHAVLI SRGETS IERHINKKERRRLQAKGRVFRNPYNYGCLDNWKVFLG VDTGRHWLTRVLLPSSHLPHGNGMSWEP PPWVTAHSASVMAV
568	1307	66	962	ATRRRAAEAGMAAVLQRVERLSNRVVRVLGCNPGPMTLQGTNT YLVGTGPRRILIDTGEPATPEYISCLKQALTEFN TAIQEI VVT HWHRDHSGGIGDICKS INNDTTYCIKKLPRNPQREEIIGNGEQ QYVYLKGDVVIKTEGATLRVLYTPGHTDDHMA LLLEENAI FS GDCILGEGTTVFEDLYDMNSL KELLKIKADIIYPGHGPIVHN AEAKIQQYISHRNIREQQILTFLRENFEKSF T VMELVKIIYKN TPENLHEMAKHNLLHLKKLEKEGKIFSN TDPDKKWK AHL

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569	1308	96	1017	ELHRAGQVAGGARRSRRESMELERIVSAALLAFVQTHLPEADL SGLDEVIFSYVLGVLEDLGPSPSEENFDM EAFTEMMEAYVPG FAHIPRGITIGDMMQKLSGQLSDARNKENLQPQSSGVQGVPI S PEPLQRPEMLKEETRSSAAAAADTQDEATGAEELLPQVDVLL EVFPTCSVEQAQWVLAKARGDLEEAQVQLVEGKEEGPAAWEGP NQDLPRRLRGPKDELKSFILQKYMVDS AEDQKIHRPMAPE APKKLIRYIDNQVVSTKGERFKDVRNPEAEEMKATYINLKPAR KYRFH
570	1309	3	526	FITGKGIVAILRCLQFNETLTELRFHNQRHMLGHHAEMEIALR LKANNTLLKMGYHFELPGPRMVVTNLLTRNQDKQRQREEQK QQQLKEQKKLIAMLENGLGLPPGMWELLGGPKPDSRMQEFFQP PPRPNNPQNVPFSQRSEMMKKPSQAPKYRTDPDSFRVVKLR IQ
571	1310	3	1858	GGRAGTQCCWRAGARLRGISPSPALPEAPGLCRVRAGLGAGAL GRSPAGRRRRRGPRVSSSPAPHPRRVLCRCLLFLFFSCHDRRGD SQPYQALKYSSKSHPSGDRHEKMRDAGDPSPPNKM LRRSDS PENKYS DSTGHSKAKNVHTRVRERDGGTSYSPQENSHNHSAL HSSNFTFFLIPSN*PQKTFRIAPYDS\ADDW/SLEHISSSGE KYYNCRTEVSQWGKTPKSGLERGQRQKEANKMAVNSFPKDRD YRREVMQATATSGFASGKSTSGDKPVSHSCTTPSTSSASGLNP TSAPPTSASA\VPVSP\VPQ\SP I PPLLQDPNLLRQLL\PALE ATLQLNNSNVDI\SIINEVLTGDTVQASLQTIHKCLTAGPSV FKITSLISQAAQLSTQAQASNQSPMSLTSDASSP\SYVSPRN KAHLKLNTVPIQTFGFSTPPVSSQPKVSTPVVKQGPVSQSATQ QPVTADKQQGHEPVSPRSLQRSSSQRSPSPGPNHTSNSSNASN ATVVPQNSSARSTCSLTPALAAHFSENLIKHVQGW PADHAEKQ ASRLREEAHNMGTIHMSEICTELKNLRSLVRVCEIQATLREQR ILFLRQQIKELEKLNQNSFMV
572	1311	2	1165	VAPECRGAYPFRAMMPGTALKAVLLAVLLVGLQATGRLLSGQ PVCRRGTQRPCYKVIYFHDTSRRLNFEEAKEACRRDGGQLVSI ESEDEQKLIKFIENLLPSDGD F WIGLRRREEKQSNSTACQDL YAWTDGSISQFRNWYVDEPSCGSEVCVMYHQPSAPAGIGGPY MFQWDDRCNMKNNFICKYSDEKPAVPSREAEGETELTTPVL PEETQEEDAKKTFKESREAA NLAYILIPSIPLLLLLLVVTTVV CWVWICRKRKREQDPSTKKQHTIWSPHQGNSPDLEVYNVIR KQSEADLAETR PDLKNISFRVCSGEATPDDMSCDYDNMAVNPS ESGFVTLVSVESGFVTNDIYEFSPDQMGRSKESGWVENBIYGY

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573	1312	3	1416	TEWGLSGSCPGCSPLEPGSRGRGAAAWRILRCRRLPEPSPFLT QPNLAQSQPAPVPVTDPSVTMHPAVFLSLPDLRCSLLLLVTW VFTPVTTEITSLDTENIDEILNNADVALVNFYADWCRFSQMLH PIFEEASDVIKEEFPNENQVVFARVDCDQHS DIAQRYRISKYP TLKLFRNGMMMKREYRGQRSVKALADYIRQQKSDPIQEIRDLA EITTLDRSKRNIIGYFEQKSDNYRVFERVANILHDDCAFLSA FGDVSKPERYSGDNIIYKPPGHSAPDMVYLGAMTNFDVTYNWI QDKCVPLVREITFENGEEELTEEGLPFLILFHMKEDTESLEIFQ NEVARQLISEKGTINFLHADCDKFRHPLLHIQKTPADCPVIAI DSFRHMYVFGDFKDVLIIPGKLKQFVFDLHSGKLHREFHHGPDP TDTAPGEQAQDVASSPPESSFQKLAPSEYRYTLLRDRDEL
574	1313	928	142	LTPSVGPVFPGRPTRPLASFPFVPLHRCSAGSQPPGVPPEGLI RIYSMRFCPYSHRTRLVLKAKDIRHEVNVNINLRNKPWYYTKH PFGHIPVLETSQCQLIYESVIACEYLDDAYPGRKLFPPDPYER ARQKMLLELFCKVPHLTKECLVALRCGRECTNLKAALRQEFNS LEEILEYQNTTFFGGTCIS MIDYLLWPWFERLDVYGILDCVSH TPALRLWISAMKWDPTVCALLMDKSI FQGFNLNLYFQNNPNAFD FGLC
575	1314	884	363	NTATNMTQPNAGTRKYSVPAISVHTSSSSSFAYDREFLRTLPGF LIVAEIVLGLLVWTLIAGTEYFRVPAFGWVMFVAVFYWVLTVF FLIIYITMTYTRIPQVPWTTVGLCFNGSAFVLYLSAAVVDASS VSPERDSHNFNSWAASSFFAFLVTICYAGNTYFSFI AWRSTI Q
576	1315	165	944	GLRDPFRKRRLKPQVKMSNYVNDMWPGSPQEKDSPSTSRSGG SSRLSSRSRSRSFSRSSRSHSRVSSRFSSRSRRSKSRSRRRR HQRKYRRYSRSYSRSRSRSRRYRERRYGFTRRYRSPSRYR SRSRSRSRGRSYCGRAYAIARGQRYYGFGRTVYPEEHSRWR DRSRTSRSRTPFRLSEKDRMELLEIAKTNAAKALGTTNIDL ASLRTVPSAKETSRGIGVSSNGAKPEVSILGLSEQNFQKANCQ I

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577	1316	265	2300	AEGSTMDLTKMGMIQLQNPNHPTGLLCKANQMRLAGTLCDEVVI MVDSQEFHAHRTVLACTSKMFEILFHRNSQHYTLDFLSPKTFQ QILEYAYTATLQAKAEDLDDLLYAAEILEIEYLEEQCLKMLET IQASDDNDTEATMADGGAEEKKDRKARYLKNIFISKHSSEESG YASVAGQSLPGPMVDQSPSVSTSFGLSAMSPTKAAVDSLMTIG QSLQGLTLPAGPEEPTLAGGGRHPGVAEVKTEMQVDEVPS QDSPGAAESSISGGMGDKVEERGKEGPGTPTRSSVITSARELH YGREESAEQVPPPAEAGQAPTGRPEHPAPPPEKHLGIYSVLPN HKADAVLSMPSSVTSGLHVQPALAVSMDFFSTYGGLLPQGFIQR ELFSKLGELAVGMKSESRITIGEQCSVCGVELPDNEAVEQHRKL HSGMPTYGCELCGRFLDSLRLRMHLLAHSAGAKAFVCDQCGA QFSKEDALETHRQTHGTDMAVFCLLCGKRFOAQSALQOHMEV HAGVRSYICSECNRTFPSHTALKRHLRSHTGDHPYECFCGSC FRDESTLKSHKRIHTGEKPYECNGCGKKFSLKHQLETHYRVHT GEKPFECKLCHQSRDYSAMIKHLRTHNGASPYQCTICTEYCP SLSSMQKHMKGHKPEEIPPDWRIEKTYLYLCYV
578	1317	686	908	IWEAPTLIFTLAGGRALGHPPMQKGSQGCALPHPLPGASLPAQ PGPADHRGWECRIGGEASVFTHLFCLPHSPT
579	1318	150	1204	ASGSPAPSSSSAMAAACGPGAAGYCLLLGLHLFLLTAGPALGW NDPDRMLLRDVKALTLHYDRYTTSRRLDPIQPKCVGGTAGCD SYTPKVIQCQNGWDGYDVQWECKTDLDIAYKFGKTVVSCEGY ESSEDQYVLRGSCGLEYNLDYTELGLQKLKESGKHGFASFSD YYYKWSSADSCNMSGLITIVVLLGIAFVVYKFLSDGQYSPPP YSEYPPFSHRYQRFTNSAGPPPPGFKSEFTGPQNTGHGATSGF GSAFTGQQGYENSGPGFWTGLGTGGILGYLFGSNRAATPFSDS WYYPSPYPPSGTWNRAYSPLHGGSGSYSVCSNSDTKTRTASG YGGTRRR
580	1319	1208	276	GRCGAMAAGLARLLLLLGLSAGGPAPAGAAKMKVVEEPNAGV NNPFLPQASRLQAKRDPSPVSGPVHLFRLSGKCFSLVESTYKY EFCPFHNVTQHEQTFRWNAYSGILGIHWEWEIANNTFTGMWMR DGDACRSRSRQSKVELACGKSNRLAHVSEPSTCVYALTFETPL VCHPHALLVYPTLPEALQRQWDQVEQDLADELITPQGHEKLLR TLFEDAGYLKTPENEPTQLEGGPDSLGFETLENCRKAHKELS KBIKRLKGLLTQHGIPIYTRPTTETSNLHLGHETPRAKSPEQLR GDPGLRGS
581	1320	1074	132	NSFWSVLFLVQEETEVARCNAQHRLRQSRDSKPDPSFRSQPID SSISFAGSDIQPLFSFASVDGTQVGEAEWAGPWAEATLLPGP GNRWPPRAGLSGNWLEEDGDWPSLPEVVGFFVSERELFRDALGA GCRILLICEMQLTHQLDLFPECRVTLILLFKDVKNAGDLRRKAM EGTIDGSLINPTVIVDPFQILVAANKAVHLYKLGMKMKRTLST EIIIFNLSPNNNISEALKKFGISANDTSILIVYIEEGEKQINQE YLISQVEGHQVSLKNLPEIMNITEVKKIYKLSSQESIGTLLD AIICRMSTKDVL

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582	1321	5021	7694	QRSWAGPGAGPEAGTRPPARGRRRQPGNVDPRRRAPQLRSQMQ VAMARATTATGNRLWPGLLIMLGSLCHRGS PCLGSLTHIEIGHR ALEFLQLHNGRVNYRELLLEHQDAYQAGIVFPDCFYPSICKGG KFHVDVSESTHWTPLNASVHYIRENYPLPWEKDEKLVAFLEFG ITSHMAADVSWHSLGLEQGFRLRTMG AIDFHGSYSEAHSAAGDFG GDVLSQFEFNFNYLARRWYVPVKDLLGIYEKLYGRKIVITENVI VDCSHIQFLEMYGEMLA VSKLYPTYSTKSPFLVEQFQEFYFLGG LDDMAFWSTNIYHLTIFMLENGTSDCNLPENPLFIACGGQQNH TQGSKMQKND FHRNLTTSLTESVDRNIN YTERGVFFSVNSWTP DSMSFIYKALERNIRTMFIGGSQLSQKHVSSPLASYFLSFPYA RLGWAMTSADLNQDGHGDLVVGAPGYSRPGHIHIGRVYLIYGN DLGLPPVDLDDKEAHRILEGFQPSGRFGSALAVLDFNVDGVP DLAVGAPSVGSEQLTYKGAVYVYFGSKQGGMSSSPNITISCQD IYCNLGTLLAADVNGDSEPD LVIGSPFAPGGGKQKGI VAAFY SGPSLSDKEKLNVEAANWTVRGEEDFSWFGYSLHGVTVDNRTL LLVGSPTWKNASRLGHLHIRDEKKSLGRVYGYFPNGQSWFT ISGDKAMGKLGTSLSSGHVLMNGTLKQVLLVGAPTYDDVSKVA FLTIVTLHQGGATRM YALTSDAQPLLLSTFSGDRRFRSFGGVLH LSDLDDDDGLDEI IMAAPLR IADVTSGLIGGEDGRVYVYNGKET TLGDMTGKCKSWITPCPEEKAQYVLISPEASSRFGSSLITVRS KAKNQVVIAAGRSSLGARLSGALHVYSLGSD
583	1322	1	357	SLRNSARGLKMAASAARGAAALRRSINQPVAFVRRIIPWTAASS QLKEHFAQFGHVRRRCILPFDKETGFHRLGWVQFSSEELRNA LQQENHIIDGVKVQVHTRRPKLPQTSDEKKDF
584	1323	1205	433	GSSNIHSASTHGFCHWFSSPSTLKRQKQAIRFQKIRRQMEAPG APPRTL TW EAMEQIRYLHEEFPESWSVPRLAEGFDVSTDVIRR VLKSKFLPTLEQKLKQDKVLKKAGLAHSLQHLRSGNNTSKLL PAGHSVSGSLLMPGHEASSKDPNHSTALKVIESDTHRTNTPRR RKGRNKEIQDLEESFVPVAAPLGHPRELQKYSSDSES PRGTGS GALPSGQKLEELKAEEDNFSSKVVQRGREFFDSNGNFLYRI
585	1324	134	954	ETRVKTSLELLRTQLEPTGTVGNTIMTSQPVPNETIIIVLPSNV INFSAEKPEPTNQGD SLKKHLHAEIKVIGTIQILCGMMVLS LGIILASASFPNFTQVTSTLLNSAYPFIGPFFFFIISGSLSIA TEKRLTKLLVHSSLVGSILSALSALVGFIILSVKQATLNPASL QCELDKNNIPTRSYVSIFYHDSLYTTDCYTAKASLAGTSLML ICTLLEFCLAVLTAVLRWKQAYSDFPGSVLFLPHSYIGNSGMS SKMTHDCGYEELLTS



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586	1325	106	1537	EMVGAMWKVIVSLVLLMPGPCDGLFRSLYRSVSMPPKGDGSGQP LFLTPYIEAGKIQKGRELSLVGPFPGGLNMKSYAGFLTIVNKTYN SNLFFWFFPAQIQPEDAPVVLWLQGGPGGSSMFGLFVEHGPYV VTSNMTLRDRDPWTTTSLMLYIDNPVGTGFSFTDDTHGYAVN EDDVARDLYSALIQFFQIFPEYKNNDFYVTGESYAGKYVPAIA HLIHSNPNPREVKINLNGIAIGDGYSDPESIIGGYAEFLYQIG LLDEKQKKYFQKQCHECIEHIRKQNWFEAFEILDKLLDGDLS DPSYFQNVGTGCSNYNFLRCTEPEDQLYYVKFLSLPEVRQAIH VGNQTFNDGTIVEKYLRDVTQSVKPWLTEIMNNYKVLINQ LDIIVAAALTERSLMGMDWKGSOEYKKAEEKVWKIFKSDSEVA GYIRQAGDFHQVIIRGGGHILPYDQPLRAFDMINRFIYGKGWD PYVG
587	1326	883	541	RDERAKVPFRSTEG\GRRRRRRMEAVVFVSLDCCALIFLSV YFIITLSDLECDYINARSCSKLNKWWIPELIGHITIVTVLLLM SLHWFIFLLNLPVATWNIYRYIMVPSGNMGVDFDPTIEHNRGQL KSHMKEAMIKLGFHLLCFFMYLYSMILALIND
588	1327	1126	732	QSPGHGAPCQLSSSHSRNRLSPMARATLSAAPSNNRLLRVA LLLLLLVAASRRRAAGAPLATELRQCQLQTLQGIHLKNIQSVKV KSPGPHCAQTEVIATLKNQKACLNPAAPMVKKIIEKMLKNGK SN
589	1328	197	330	HPLSLVFLALNTGKEKSHPGGGGERPGLAGQGEPDHPAGARDG R
590	1329	1	1575	CTPVARSMATTATCTRTDDYQLFEELGKGAFSVVRRRCVKKTS TQEYAAKIINTKKLSARDHQKLREARICRLKHPNIVRLHDS ISEEGFHYLVFDLVTGGELFEDIVAREYYSEADASHCIHQILE SVNHIHQHDIVHRDLKPENLLLASKCKGA AVKLADFGLAIEVQ GEQQAWFGFAGTPGYLSPEVLRKDPYGPVDIWACGVILYILL VGYPFPWDEDQHKLYQQIKAGAYDFPSPEWDTVTPEAKNLINQ MLTINPAKRITADQALKHPWVCQRSTVASMMHRQETVECLRKF NARRKLKGAILTTMLVSRNFSAAKSLNKKSDGGVKPQSNKN SLVSPAQEPAPLQTAMEPQTTVVHNATDGIKGSTESCNTTTED EDLKVRKQEIIEKITEQLIEAINNGDFEAYTKICDPGLTSFEPE ALGNLVEGMDFFHKFYFENLLSKNSKPIHTTILNPHVHIGEDA ACIAYIRLTQYIDGQGRPRTSQSEETRVVHRRDQKWLNVHYHC SGAPAAPLQ
591	1330	17	636	NRRTVKMLLELSEEHKEHLAFLPQVDSAVVAEFGRIAVEFLRR GANPKIYEGAARKLVSSDTVQHGVGLTYLLTSSKLMISEL DFQDSVFVLGFSEELNKLQLYLDNRKEIRTILSEL\APSLP SYHNLEWRLDVQLASRSLRQKIPAVTIKLHLNQNGDHNTKVL QTDPATLLHLVQOLEQALEEMKTNHCRRVVRNIK
592	1331	1	237	GTSIYLAHRVA\RAWELAQFIHTTSKKADVVLACGDSIVHPED LICCPLTGRSCLCDVHLLSSLLARLGRGYAVSLTNL

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593	1332	2506	1684	RGCGSCGYKPSAGPAWRPRPPPAVSPLRHPEPAKVLFSFSSCPL PALGRTGPSRAARAQSLTMASLFKKKTVDVKEQNRELRTQ RAIIRDRAALEKQEKQLELEIKKMAKIGNKEACKVLAKQLVHL RKQKTRTFVAVSSKVTSMSTQTKVMNSQMKMAGAMSTTAKTMQA VNKKMDPQKTLQTMQNFQKENMKMEMTEEMINDTLDDIFDGS DDEESQDIVNQVLDEIGIEISGKMAKAPSAARSLPSASTSKAT ISDEETIERQLKALGVD
594	1333	905	432	STDGNGAERLFAELRKMNARGLGSELKDSIPVTELSASGPFES HDLLRKGFSCVKNELLPSHPLELSEKNFQLNQDKMNFSTLRNI QGLFAPLKLQMEFKAVQQVQRLPFLSSSNLSLDVLRGNDETIG FEDILNDPSQSEVMGEPHLMVEYKLGILL
595	1334	111	117	RNMKLHYVAVLTLAILMFLTWPESLSCNKALCASDVSKCLIQ ELCQCRPGEGNCSCKECLCLGALWDECCDCVGMCPNPNYS DTPPTSKSTVEELHEPIPSLFRALTEGDTQLNWNIVSFPVAEEL SHHENLVSFLETVNQPHHQNVSVPSNNVHAPYSSDK/E*LPTV DFFHSAPSCGLSM*SIIFFEET
596	1335	817	278	VGGVPTWLEGGSGNPSPRSGGGPGARLTLPALQMTVHNLYLF DRNGVCLHYSEWHRKKQAGIPKEEYKLMYGMLFSIRSFSVKM SPLDMKDGFLAFQTSRYKLHYETPTGIKVMNTDLGVGPIRD VLHHIYSALYVELVVKNPCLPLGQTVQSELFRSLDSYVRS LP FFSARAG
597	1336	171	881	PGLSQEPGSGMETVVIVAIGVLATIFLASFAALVLVCRQRYCR PRDLLQRYDSKPIVDLIGAMETQSEPSELELDDVVITNPHIEA ILENEDWIEDASGLMSHCIAILKICHTLTEKLVAMTMGSGAKM KTSASVSDIIVVAKRISPRVDDVVKSMYPPLDPKLLDARTTAL LLSVSHLVLVTRNACHLTGGLDWIDQSLSAEEHLEVLREAAAL ASEPDKGLPGPEGFLQEQAIS
598	1337	1078	594	VGMELPAVNLKVILLGHWLLTTWGCIVFSGSYAWANFTILALG VWAVAQRDSIDAISMFLGGLLATIFLDIVHISIFYPRVSLTDT GRFGVGMAILSLLLKPLSCCFVYHMYRERGGELLVHTGFLGSS QDRSAYQTIDSAEAPADPFAVPEGRSQDARGY
599	1338	717	116	PASRPLLGPDTGSVANIFKGLVILPEMSLVIRNLQRVIPIRRA PLRSKIEIVRRILGVQKFDLGIICVDNKNIQHINRIYDRNVP TDVLSFPFHEHLKAGEFPQPDFDDYNLGDIFLGVEYIFHQCK ENEDYNDVLTVTATHGLCHLLGFTHGTEAEWQQMFQKEKAVLD ELGRRGTGTRLOPLTPGPLPEGAEGRVPF
600	1339	1	804	LRNALDVLHREVPRVLVNLVDLNPITMRQVFLGNPDKCPVQQ A/MLEPLGSKTETDLRAEMPITCPTQNEPFLRTPRNSNYTYP IKPAIENWGSDFLCTEWKASNSVPTSVHQLRPADIKVVAALGD SLTTAVGARPNNSDLPTSWRGLSWSIGGDCNLEHTHTLPLNIL KKFNPYLLGFSTSTWEGTAGLNVAEAGARARDMPAQAWDLVER MKNSPDINLEKDWKLVTLFIGGNDLCHYCENPEAHLATEYVQH IQQALDILSE

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601	1340	1	860	VVEFLWSRRPSGSSDPRPRRPASKCQMMEERANLMHMMKLSIK VLLQSALSGLRSLDADHAPLQQFFVVMHCHLKHGLVKKSF QNKSFPGPLELVEKLCPEASDIATSVRNLPDLKTAVGRGRAWL YLALMQKKLADYLVKVLIDNKHLLSEFYEPALMMEEGMVIVG LLVGLNVLDANL\CLKGEDLDSQVGVIDFSLYLKDVLQDLGGK EHERITDVLQKNYVEELNRHLSCTVGDLOTKIDGLEKTNSKL QERVSAATDRICSLQEEQQQLREQNELIR
602	1341	60	762	KPEGARRVQFVMGLFGKTQEKPPKELVNEWSLKIRKEMRVVDR QIRDIQREEEKVKRSVKDAAKKGQKDVCIVLAKEMIRSRKAVS KLYASKAHMNSVLMGMKNQLAVLRVAGSLQKSTEVKAMQSLV KIPEIQATMRELSKEMMKAGIIIEEMLEDTFESMDDQEEMEEEA EMEIDRILFEITAGALGKAPSKVTDALPEPEPPGMAASEDEE EEEEALEAMQSRLATLRS
603	1342	3	456	RWNSIMELALLCGLVVMAGVIPIQGGILNLNKMVKQVTGKMPI LSYWPYGCCHGLGGRGQPKDATDWCCQTHDCCYDHLKTQCGCI YKDYRYNFSQGNIHCSDKGSWCEQQLCACDKEVAFCLKRNL TYQKRLRFYWRPHCRGQTPGC
604	1343	249	632	KTVAEEASVGNPEGAFMKMLQARKQHMSTELTIESEAPSDSSG INLSGFGSEQLDTNDES DVSSALSYILPYLSLRNLGAESILLP FTEQLFSNVQDGDRLLSILKNNRKSPSQSSLLGNKFKNKIF
605	1344	2	382	LPLTLILAAAPFAHLLLPBGHDQSPCWHPGALSPGTLGPLSWA MANSGLQLLGYYFLALGGWVGIIASTALPQWKQSSYAGDASIQL RSKVVFVLESEWGGDSLGLPRDCGWSCLLHSAVRSEKGFWS
606	1345	2	987	DPRVRPPLLPPLPRLVILKMAPLDLDKYVEIARLCKYLP ENDLKRLCDYVCDLLEESNVQPVSTPVTVCVDIHGQFYDLCE LFRTGGQVPDTNYIFMGDFVDRGYYSLETFTYLLALKAKWPDR ITLLRGNHESRQITQVYGFYDECQTKYGNANAWRYCTKVFDML TVAALIDEQILCVHGGSLPDIKTLQIRTIERNQEI PHKGAF DLVWSDPEDVDTWAI SPRGAGWLF GAKVTNEFVHINNLKLCR AHQLVHEGYKFMFDEKLVTVWSAPNYCYRCGNIASIMVPKDVN TREPKLFRAPVDSERVIPRRTTTPYFL
607	1346	10	768	SFAGAAARPSTPPASGRGAAPGRPGSPMDLRAGDSWGMILACL CTVLWHLPAVPALNRTGDPGPGPSIQKTYDLTRYLHQLRSLA GTYLNYLGPPFNEPDEFNPPRLGAETLPRATVDLEVWRSNDKL RLTONYEAYSHLLCYLRGLNRQAATAELRRSLAHFCTSLQGLL GSIAGVMAALGYPLPQPLPGTEPTWTPGPAHSDFLQKMDDFWL LKLQTLWLSAKDFNRLKKKMQPPAAVTLHLGAHGF
608	1347	114	700	IKISLKKRSMGSGPCFFLWGLLALLGLALVISLIFNISHYV EKQRQDKMYSYSSDHTRVDEYYIEDTPIYGNLDDMISEPMDEN CYBQMKARPEKSVNKMQEATPSAQATNETQMCYASLDHSVKGK RRKPRKQNTHFSDKDGDEQLHAIDASVSKTTLVDSFSPESQAV EENIHDDPIRLFGLIRAKREPIN

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609	1348	2	807	VEFHPQRRARAGARAPSMGVLLTQRTLLSLVLALLFPMSMAA IGSCSKEYRVLLGQLQKQTDLMQDTSRLLDPIYIRIQGLDVPKL REHCRERPGAFPSSEETLRGLGRRCFLOTLNATLGCVLHRLADL EQRLPKAQDLERSGLNIEDLEKLQMARPNILGLRNNIYCMQAL LDNSDTAEPTKAGRGASQPPTPTPASDAFQRKLEGCRFLHGYH RFMHSVGRVFSKWGESPNRSRRHSPHQALRKGVRRTSPSRKKGK RLMTRGQLPR
610	1349	2	418	DFFPGRFRRLVWLLVLRLPWRVPGQLDPTTGRRFSEHKLCADDE CSMLMYRGEALEDFTGPD CRFVNFKKGDPVYVYKLRGWPEV WAGSVGRFTFGYFPKDLIQVVHEYTKBELQVPTNETDFVCFDGG RDDDFHNYNV
611	1350	823	115	SPLGKEGQEEVRVKIKDLNEHIVCCLCAGYFVDATTTITECLHT FCKSCIVKYLQTSKYCPMCNIIKHETQPLLNLKLDVRVMDIVY KLVPGLQDSEKRIREFYQSRGLDRVTQPTGEEPALSNLGLPF SSFHDSKAHYRYDEQLNLCLERLSSGKDKNKSVLQNKYVRCS VRAEVRHLRRVLCHRLMLNPQHVLQDFDNEVLPDHMTMKQIWL SRWFGKPSPLLLQYSVKEKRR
612	1351	9	545	LWWYSAHAADVAMMDVFGVGFPSKVPWKKMSAEELNQYCPSR WVVRLGAEALRTYSQIGIEATTRARATRSLLHVPYGDGEKE KVDIYFPDESSEATTRARATRSLLHVPYGDGEKEKVDIYFPD ESSEALPFFLFFHGGYWQSGRHPGPHGRPGDPQRCVCPEAVSK QQAFSW
613	1352	49	902	GVRMASRGRRRPEHGGPPELFYDETEARKYVRNSRMIDIQTRMA GRALELLYL PENKPCYLLDIGCGTGLSGSYLSDEGHYVWGLDI SPAMLDEAVDREIEGDL LLLGDMGQGI PFKPGTFDGCISISAVQ WLCNANKKSENPAKRLYCFASLFSVLVRGSRVQLYLPENSE QLELITTOATKAGFSGGMVVDYPNSAKAKKFYLCFSGPSTFI PEGLSENQDEVEPRESVFTNERFPLRMSRRGMVRKSRWVLEK KERHRRQGREVRPDTQYTGRKRKPRF
614	1353	1960	871	TLICRMAGCGEIDHSINMLPTNRKANESCSNTAPSLTVPECAI CLQTCVHPVSLPCKHVFCYLCVKGASWLGKRCALCRQEIPEDF LDKPTLLSPEELKAASRGNGEYAWYYEGRNGWWQYDERTSREL EDAFSGKKNTTEMLIAGFLYVADLENMVQYRRNEHGRRRKIKR DIIDIPKKGVAGLRLDCDANTVNLARESSADGADSVSAQSGAS VQPLVSSVRPLTSVDGQLTSPATPSPDASTSLEDSFAHLQLSG DNTAERSHRGEGEEDHESPSSGRVPAPDTSIEETESDASSDSE DVSAVVAQHSLTQQRLLVSNANQTVPDRSDRSRGTDRSVAGGGT VSVSVRSRRPDGQCTVTEV

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615	1354	5653	4549	GATPLGSVGGRTGKMDAATLTyDTLRFAEFEDFPETSEPVWILGRKYSIFTEKDEILSDVASRLWFTYRKNFPAIGGTGPTSDTGWGCMLRCGQMIFAQALVCRHLGRDWRWTQRKRQPD SYFSVLNAFIDRKDSYYSIHQIAQMGVGEKSGSIGQWYGPNTVAQVLKKLAVFDTWSSLAVHIAMDNTVMEEIRRLCRTSVPCAGATAFPADSDRHCNGFPAGAEVTNRPSWRPLVLLIPLRLGLTDINEAYVETLKHCFMMPQSLGVIGGKPN SAHYFIGYVGEELIYLDPHTTQPAVEPTDGC FIPDES FHCQHPPCRMSIAELDPSIAVVRGHHLS TQAFGAECCLGMTRKTFGFLRFFFSMLG
616	1355	416	65	PTTSNRAITLTAWPKIPFLGICEAKNPRSENMRLATILEVACHHLGSGPPPSWELWEQPPGNSSRYIEFLNKHTYIKGTLRVYTKKFCMLVIKSFESKSCVCVYDFDSKSSVNVTV
617	1356	2	382	PRVRFRLLHVTSTIRSAWILCGIIWILIMASSIMLLDSGSEQNGSVTSCLELNLYKIAKLQTVNYIALVVGCLLPFFTLSCYLLIIRVLLKVEVPESGLRVSHRKALTTIIITLIIFFLCFLPYHT
618	1357	3	672	GRHWLGSAQLTDGGSARKPKMAVPAALILRESPSMKKAVSLIN AIDTGRFPRLLTRILQKLHLKAESSFSEEEEEKLQAAFSLEKQDLHLVLETISFILEQAVYHNVKPAALQQLENIHLRQDKAEAFVNTWSSMGQETVEKFRQRI LAPCKLETVGWQNLNQMHA SAQAKLKSPQAVLQ LGVNEDSKSLEKVLVEFSHKELDFYNKLETIQ AQLDSL T
619	1358	557	208	EASSAKTKRKEEKGP KAKMKLMVLVFTTIGLTL LLGVQAMPANRLSCYRKILKDHNCHNLPEGVADLTQIDVNVQDHFWDGKGCEMICYCNFSELLCCPKDVFFGPKISFVIPCNQ
620	1359	335	1735	KMAEAVFHAPKRKR RVYETYESPLPIPFQDGHGPLKEFKIFRAEMINNNVIVRNAEDIEQLYKG YFGKGILSRSRPSFTISDPKL VAKWKDMKTNMPIITSKRYQHSVEWAAELMRRQGQDESTVRRILKDYTKPLEHPPVKRNEEAQVHDKLNSGMVSNMEGTAGGERPSVVNGDSGKSGGVGDPREPLGCLQEGSGCHPTTESFEKSVREDA SPLPHVCCCKQDALILQRLHHEDGSQHIGLLHPGDRGPDHEYVLVEEAECAMSEREAAPNEELVQRNRLICRRNPYRIFEYLQLSLEEAFLLVYALGCLSIYYEKEPLTIVKLWKAFTVVQPTFRTTYMAYHYFRSKGWVPKVGLKYGTDLLLYRKGPFFYHASYSVIELVDDHFEGLRRLPSWKS LAALSRVSVNVSKELMLCYLIK PSTMTDKEMESPECMKRIKVQEVILSRWVSSRERSDQDDL

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621	1360	5693	4435	RDIWTMNLQRYWGEIPISSSQTNRSSFDLLPREFRLVEVHDPP LHQFSANKPKPPTMLDIPSEPCSLTIHTIQLIQHNRRRLRLNLT TAQAQNOQQTEGVKTEESEPLPSCPGSPPLPDDLLPLDCKNPN ABFQIRHSDPESDFYRGKGEPVTELSWHSCRQLLYQAVATILA HAGFDCANESVLETLTDVAHEYCLKFTKLLRFAVDREARLGQT PPPDVMEQVFHEVGIGSVLSLQKFWQHR IKDYHSYMLQISKQL SEYERIVNPEKATEDAKPVKIKEEPVSDITFPVSEELEADLA SGDQSLPMGVLGASERFPSNLEVEASPQASSAEVNASPLWNL AHVKMEPQSEEGNVSGHGVLSGVDFEPPMSGMSEAGIPQSPD DSDSSYGSHSTDLSLMGSSPVFNQRCKKMRKI
622	1361	15	678	REQILFIEIRDTAKGGETEQQPSLSPLHGGRMPMEGEGIQSLA RETQSHRGRRGWDATWVTRCRESLNRGGAGAGKRAGALAHHV FLALIEPNLAEREASEEEVKACSDETVVADLLVKVVYVLGAIL KIFLREGNVNLNQHSGMDIEKYSEHYQHDHSPGAEDDAAGGQLR PTAQERRHKEGSRGSPRCKRARKAVGESPGCPRPRVRPRVRPR VRPRV
623	1362	1080	835	GTRGCCREGTAYAKAYQFMASHLSLGKPVSTGSI PRFNKALFN KQAKCKPNHYSFIGLSMLS PENFSIGCKYSVWFSETKGF
624	1363	872	441	GAQGVVRVGIGEVGRVQAPRVSLLSHQGVPRGGTGEAVKEEGRG SSLHPPLPPQGLGEYAAQCASHAFMKGVFTFVTGTGMAGFLQMF IQRKFPPYPLQWSSLVAVVAGSVVSYGVTREVESEKCNLWLFLE TGQLPKDRSTDQRS
625	1364	1	585	GTSELLCTQRWNWGPAPPPRPGALAPTQLQLLVEMGSAKSVPV TPARPPPHNKHARVADPRSPSAGILRTP IQVESSPQPGLPAG EQLEGLKHAQSDPRSPLGKN*GHGWQVGQSDLGSPQPLPPS ASHL/YSSRASRCSQPPCLSLPWFVGRSPANTYHVPVTSCLP SPALHYTALQAGIISTSQARAPR
626	1365	36	381	PLLLPRFIDIPCLLCYLTQVTDDMYAKAFLIKPNTAITGTDR RKL\RADETTFDFP\TLGTDQIYELLPGKDELNIVKSNNAHKRDA *TAYVSGENHILSEP*KNLYPAVNTLSSYP
627	1366	763	1003	SRQPPPLLTMTVFLLLEFLFLVFFPGCVNQLLSYPPWQGQGTSLW SSLSFWHLLPQEDSSRLSIFPLRAGSPQPAQAPQRI
628	1367	296	1199	KSREQSSLFAADAERSWGGKSCCLLRWRFVKGASHFPRLPLP GEERPETKERAWKMEQTWTRDYFAEDDGEMVPTSTHTA/ASVS LTAFLSDTKDRGPPVQSQIWRSGEKVPFVQTYSLRAFEKPPQV QTQALRDFEKHLNDLKKENFSLKLLIYFLEERMQQKYEASRED IYKRNTLKVESLSKRELQDKKQHLDKTWADVENLNSQNEAE LRRQFEERQQEMEHVYELLENKMQLLQEE SRLAKNEAARMAAL VEAEKECNLELSEKLGVTKNWEDVPGDQVKPDQYTEALAQRD K

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629	1368	191	1116	TRRRGTTWRSRPRRASTRSRPSTRPRGVASWPWETAGTATTGPGPSARTRRRAARRRRSRPRRAHGGLSQPAGWQSLLSFTILFLAWLAGFSSRLFAVIRFESI IHEFDPWFNYSRSTHHLASHGFYEF LNWFDERAWYPLGRIVGGTVYPGLMITAGLIHWILNTLNTVH IRDVCVFLAPTFSGLTSISTFLLTRELWNQAGALLAACFIAIV PGYISRSVAGSFDNEGIAIFALQFTYYLWVKSVKTSVFWTMC CCLSYFYMVSAWGGYVFIINLIPLHAFVLVLM/Q/RYSKRVIYI *YSTFYIVG
630	1369	852	214	RRLIVVLSDAFLSRAWCSHSF/RVGPARGWVGPSVAPTPLTVP PRREGLCRLLELTRRPIFITFEGQRRDPAHPALRLLRQHRHLV TLLLRWPGSVTPSSDFWKEVQLALPRKVRYRPVEGDPQTQLQD DKDPMLILRGRVPEGRALDSEVDPDPEGDLGVRGPVFGEPSAP PHTSGVSLGESRSSEVDVSDLGSRNYSARTDFYCLVSKDDM
631	1370	246	1091	LSHEGWRRRGREGERINSSVASLAPLCILPDLP SNMHLARLVGS CSLLLLLLGALSGWAASDDPIEKVIEGINRGLSNAEREVGKALD GINSGITAGREVEKVFNGLSNMGSHSTGKELDKGVQGLNHGMD KVAHEINHIGIGQAGKEAEKLGHGVMNNAAGQAGKEADKAVQGFH TGVHQAGKEAEKLGQGVNHAADQAGKEVEKLGQGAHHAAGQAG KELQNAHNGVNQASKEANQLLNGNHQSGSSSHQGGATTTPLAS GASVNTFPFNLPALWRSVANIMP
632	1371	3150	2792	SASGGLGMTVEGPEGSEHREHPPEKPPRPPRPLHLSDRSFRRK KDSVESHPWTWDDTRIDADAIVEKIVQSQDFTDGSNTEDSNLR LFVSRDGSATLSGIQLATRVSSGVYEPVVIESH
633	1372	667	993	ERSGWPOPEGTVTAQGPLFWERL SGAVTVSSGYKADMWPSFPQ \VRVGSFLFGILFFSFGSSSLPPGLPPPASLLCCAVQWGARAL FLPCLKERALGMEMRNNTLSFRQ
634	1373	636	2	SSSNLRLSFLINENILGKCFRSGPSCAGPRISPLAAQYECPRP SLLIMASVPKTNKIEPRSYSIIPSCGI\RLG PALNTLIF\QS KRFGPRG\HSAKSIEGAPRGKGRGRAVARLAADRPPAPKIQLR AF*LQQL*YTLLELELPRL LAPDLPSNGSSLKDLKWTSHNYRA SKESCIVIF\VTTS PGREWICALAAFLGCGS\LSQAPSPES
635	1374	61	519	LRIINTYFCFKFLIVNYIHGTTKARKPHVLGESLISAMSRQEP KMFVLLYVTSFAICASGQPRGNQLKGENYSERYICSIPGLPGP PGPPGANGSPGPHGRIGLPGRDGRDGRKGEKGEKGTAGLRGKT GPLGLAGEKGDQGETGKKGPIGPE
636	1375	129	579	FASAMLSRVDRPKLSVAPSVVLEEDQVLVSPAVDLEAGCRLR DFTEKIMNVKGVILSMLVSTVIIVFWEFINSTEGSFLWIYH SKNPEVDDSSAQKGWWFLSWFNNGIHNYQQGEEDIDKEKGREE TKGRKMTQQSFGYGTGLIQT

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637	1376	127	1376	GSHRFSLASPLDPEVGPYCDTPTMRTLNFLLWLALACSPVHTT LSKSDAKKAASKTLLEKSQFSDKPVQDRGLVVTDLKAESVLE HRSYCSAKARDRHFAAGDVLGYVTPWNSHGYDVTKVFGSKFTQI SPVWLQLKRRGREMFVETGLHDVDQGWMAVRKHAAGLHIVPR LLFEDWTYDDFRNVLDSEDEIEELSKTVVQVAKNQHFDFGVVE VWNQLLSQKRVGLIHMLTHLAEALHQAARLLALLVIPTAITPGT DQLGMFTHKEFEQLAPVLDGFSIMTYDYSTAHPGPNAPLSWV RACVQVLDPKSKWRSKILLGLNFYGM DYATSKDAREPVVGARY IQTLKDHPRPMVWDSQVSEHFFFEYKKSRSRGRHVVFYPTLKSLO VRLELARELGVGVS IWELGQGLDYFYDLL
638	1377	998	48	GREGTCWGPAMSEVTRSLLRWGASFRGADFDSDWGQLVEAID EYQILARHLQKEAQAQHNNSEFTEEQKKTIGKIATCLELRSAA LQSTQSQEEFKLEDLKKLEPILKNILTYNKEFFDFDVPVPLRR ILAPGEEENLEFEEDEEEGGAGAGSPDSFPARVPGTLLPRLPS EPGMTLLTIRIEKIGLKDAGQCINPYITVSVKDLNGIDLTPVQ DTPVASRKEDTYVHFNVDELQKHVEKLTGAAIFFEFKHYKP KKRFTSTKCFAFMEMDEIKLGPVIELYKKPTDFKRKQLQLLT KKPLYLHLHQTLHKE
639	1378	1298	1569	GSITSEPSLDSLQPLPPGFKRFSCSLSPSSWDYRRPPPGLAYF CIFSREDEVSPCWPGCSPSPDLMIRLPRPPSVGITGVSHRAWPT IDNF
640	1379	196	1197	KMPVPWFLLSLALGRSPVVLSELRVGPQDATHCSPGLSCRLW DSDILCLPGDIVPAPGPVLAPTHLQTELVLRCQKETDCDLCLR VAVHLAVHGHWEPEDEEKFGGAADSGVEEPRNASLQAQVVL S FQAYPTARCVLLEVQVPAALVQFGQSVGSVVYDCFEAALGSEV RIWSTYQPRYEKELNHTQQLPDCRGLEVNWSIPSCWALPWLNV SADGDNVHLVLNVSEEQHFGLSLYWNQVQGPCKPRWHKNLVRP PPSQVHSHCRP\CLCK\DAVPYQRGSLKRTHPKQKGIGGTS A FLVSLTLASSSSSLSSPTSFLYLFRHLDRRSLP
641	1380	756	1110	LRLWNRNQMMHNIIVKELIVTFFLGITVVQMLISVTGLKGVEA QNGSESEVFGKYETLVFYWPSSLCLAFLLGRFLHMFVKALRV HLGWELQVEEKSVLEVHQGEHVQKLLRIPRP
642	1381	631	1278	KVNRKLRKKGKISHDKRKRSKAIGSDTSDIVHIWCPEGMKT SDIKELNIVLPEFEKTHLEHQRIESKVCKAAIATFYVNVKEQ FIKMLKESQMLTNLKRKNAMISDIEKKRQRMIEVQDELLRLE PQLKQLQTKYDELKERKSSLRNAAYFLSNLKQLYQDYSDVQAQ EPNVKETYDSSSLPALLFKARTLLGAESHLRNINHQLEKLLDQ G
643	1382	1167	755	VWAMEEPPVREEE*EEGEDEERDEVGPEGALGKSPFQLTAE DVYDISYLLGRELMALGSDPRVTQLQFKVVRVLEMLEALVNEG SLALEELKMERDHLRKEVEGLRRQSPASGEWPDSTKRRPRRK KKRKCCGY



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644	1383	1	271	PRNDHRLTQSRDSSSKTRAFLVPRFLPAHAGVTSEERTAMKR EGGAHLCSDSLPESSQQDGNHAPNFSSHGSCRRRQRRHDKA LHAR
645	1384	1	499	THASEKSRATMSSWSRQRPKSPGGIQPHVSRTFLLLLLLAASA WGVTLSPKDCQVFRSDHGSSISCQPPAEIPGYLPADTVHLAVE FFNLTHLPANLLQGASKLQELHLSSNGLESLSPEFLRPVQRLR VLDLTRNALTGLPPGLFQASATLDTLVLENQLEVL
646	1385	178	675	ERPRIMDLAQLLSQFLCHLVFCYVFASGLIINTIQLFTLLL WPINKQLFRKINCRSLSYCISSQLVLMLEWWSGTECTIFTDPRA YLKYGKENAIVVLNHKF\EI\DFLCGWSLSERFGLLGVSQKCI PPCLTHFFGSAPPLVFLLLVIQNLQKNQQSFFYLMKWS
647	1386	630	1499	MIVFGWAVFLASRLGQGLLLTLEEHLAHFLGTGGAATTMGNS CICRDDSGTDDSDVTQQQQAENSAVPTADTRSQPRDPVRPPRR GRGPHEPRRKKQNVLDGLVLDLAVIRTLVDNDQEPYSMITLH EMAETDEGWLDVVQSLIRVIPLDPLGPAVITLLLLDECPLPTK DALQKLTEILNLNGEVACQDSSHPAKHRNTSAVLGCLAELAG PASIGLLSPGILEYLLQCLLQSHPTVLMFALIALEKFAQTSEN KLTISSSSISDRL\VTLESW\ANDPDYLKRQVG
648	1387	1	962	RFGTRGLAKSKGVVLMALCALTRALRSNLAPPTVAAPAPSLF PAAQMNNGLLQQPSALMLLPCRPLTSVALNANFVSWKSRTK YTITPVKMRKSGGRDHTGRIRVHGIGGGHKQRYRMIDFLFRP EETKSGPFEEKVIOVRYDPCRSADIALVAGGSRKRWI IATENM QAGDTILNSNHIGRMAVAAREGDAHPLGALPVGTLLNNVESEP GRGAQYIRAAGTCGVLLRKVNGTAI IQLPSKRQMQLVETCVAT VGRVSNVDHNKRVIGKAGNRWLKGRPNSGRWHRKGGWAGRKI RPLPPMKSYVKLPASAQS
649	1388	291	714	PVQGARCWLDARRNVRVFSGVCCGCGIHGYWAEPCGGCGAMEG LRSSVELDPELTPGKLDEEMVGLPPHDAS PQVTFHSLDGKTVV CPHFMGLLLGLLLLLLTLVSRNQLCVRGERQLAETLHSQVKEKS QLIGKKTDCRD
650	1389	874	2220	GARGRPLAETWPFLTAPVLPGLQITEPTMAEKGDCIASVYGY DLGGRFVDFQPLGFGVNLVLSAVDSRACRKVAVKKIALSDAR SMKHALREIKIIRRLDHDNIVKVYEVLPKGTDLQGLFKFSV AYIVQEYMETDLARLLQGTLAEEHAKLFMYQLLRGLKYIHS NVLHRDLKPANIFISTEDLVLKIGDFGLARIVDQHYS\HKGYL SEGLVTKWYRSPRLLLSPNNYTKAIDMWAAGCILAEMLTGRML FAGAHELEQMQLILETIPVIREEDKDELLRVMPFSFVSSTWEVK RPLRKLPEVNSEAI DFLEKILTFNPMDRLTAEMLGQHPYMS YSCPEDEPTSQHPFRIEDEIDDIVLMAANQS QLSNWDTCSSRY PVSLSSDLLEWRPDRCDASEVQORDPRAGSAPLAENVQVDPK SHSSSASCQAGRNGVSRYQ

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651	1390	1	2451	MRTLGTCLATLAGLLLTAAGETFSGGCLFDEPYSTCGYSQSEG DDFNWEQVNTLTKTPTSDPWMPSGSFMLVNASGRPEGQRAHLLL PQLKENDTHCIDFHYFVSSKSNPPGLNVYVKVNNGLPLGNPI WNISGDPTRTWNRAELAISTFWPNFYQVIFEVITSGHQGYLAI DEVKVLGHPCTRTPHFLRIQNEVNAGQFATFQCSAIGRTVAG DRLWLQGIDVRDAPLKEIKVTSSRRFIASFNVVNTTKRDAGKY RCMIRTEGGVGISNYAEL\VVKEPPVPIAPPQLASVGATYVW IQLNANSINGDGPIVAREVEYCTASGSWNRQPV DSTSYKIGH LDPDTEYEISVLLTRPGEGETGSPGPALRTRTKCADPMRGPRK LEVVEVKSRQITIRWEPFGYNVTRCHSYNLTVHYCYQVGGQEQ VREEVSWDTENSHPQHTITNLSPTYTNVSVKLILMNPEGRKESQ ELIVQTDDELPGAVPTESIQGSTFEEKIFLQWREPTQTYGVIT LYEITYKAVSSFDPEIDLSNQSGRVSKLGNETHFLFFGLYPGT TYSFTIRASTAKGFGPPATNQFTTKISAPSMPAYELETPLNQD DNTVTVMKPAHSRGAPVSVYQIVVEEERPRRTKKTEILKCY PVPIHFQNASLLNSQYYFAAEFPADSLQAAQPFTIGDNKTYNG YWNTPLLPHYKSYRIYFQAASRANGETKIDCVQVATKGAATPKP VPEPEKQTDHTVKIAGVIAGILLFVIIIFLGVLVMMKKRLYKHG ASICSASGEASGSFQSWRKAKHKQACPMARAGARERAGGCLKL
652	1391	30	459	GIRQLQLSRASMAARKSWTALRLCATVVVLDVVCKGFVQDL DESFKENRNDIWLHVFYAPWCGHCKKLEPIWNEAGLEMKSIG SPVKAGKMDATSYSSIASSEFGVGRGYPTIKLALIRPLPSQQMFE HMKRHRVFFVYV
653	1392	168	1016	GLVIVISHFSPSPGLLPATQSPAMSDPITLNVGGKLYTTSLAT LTSFPDSMLGAMFSGKMPTKRDSQGNCFIDRDGKVFYRIILNFI RTSHLDLPEDFQEMGLLRREADFYQVQPLIEALQEKEVELSKA EKNAMLNITLNQVRVQTVHFTVREAPQIYSLSSSSMEVFANIF STSCLFLKLLGSKLFYCSNGNLSSITSHLQDPNHLTLDWVANV EGLPEEEYTKQNLKRLWVVPANKQINSFQVFVEEVLKIALSDG FCIDSSHPHALDFMNNKIIRLIRY
654	1393	3	927	SCADNLVAASGGCWFVLGERRAGSLLSASYGTFAMPGMVLFGR RWAIASDDLVPFGFFELVVRVLWWIGILTLYLMHRGKLD CAGG ALLSSYLIVLMILLAVVICTVSAIMCVSMRGTCNPGPRKSMS KLLYIRLALFFPEMVWASLGAAWVADGVQCDRTVNGIATVV VSWIIIAATVVSIIIVFDPLGGKMAPYSSAGPSHLDSDHSSQL LNGLKTAATSVWETRIKLLCCCIGKDDHTRVAFSSSTAELFSTY FSDTDLVPSDIAAGLALLHQQQDNIRNNQ\DLPRWSAMPQGAP RKLIWMQN
655	1394	1	716	FRAATAAAKNGGGGGGRAGAGDASGTRKKKGPGPLATAYLVII NVVMTAGWLVIAGLVRAYLAKGSYHSLYYSIEKPLKFFQTGA LLEILHCAIGIVPSSVVLTSFQVMSRVFLIWAHTSVKEVQSE DSVL\FVIAWTITEIIIRYSFYTFSLNHLPLYLIKRARYTLFIV LYPMGVSGELLTIYAALPFVRQAGLYSISLPNSTKKIFLISQV WWHMLAVSADAKAAEMPAVLKPGP

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656	1395	72	766	MLTGVGCLVSSSESLSCVQCNSWEKSCVNSIASECPSHANTSCI SSSASSSLETVPVRLYQNMFCSAENCSEETHITAFTHVHSAEEH FHFVSQCCEGKECSNTSDALDPPLKNVSSNAECPACYESNGTS CRGKPWKCYEEEQCVFLVAELKNDIESKSLVLKGCNSVSNATC QFLSGENKTLGGVIFRKFEKANVNSLTPTSAPTTHNVGSKAS LYLLALASLLLRGLLP
657	1396	97	746	VPARRAMEIGTEISRKIRSAIKGKLQELGAYVDEELPDYIMV MVANKKSQDQMTEDLSLFLGNNTIRFTVWLHGVLDKLRSVTTE PSSLKSSDTNIFDSNVPSNKSNSFRGDERRHEAAVPP\AIPS ARPEKDRSRVSTSSQESKTTNVRQTYDDGAATRLMSTV/KPLR EPAPSEDVIDIKPEPDDLIDEDLNFVQEKPLSQKKPTVTLTYG SSR
658	1397	155	560	ASRVLAAMGLPWGQPHLGLQMLLLALNWLRLPSLSLELVPYTP QITAWDLGKVTATTFSLEQPRCVFDGLASASDTVWLVAFSN ASRGFQNPETLADIPASPQLLTDGHYMTLPLSPDQLPCGDPMA GSGSAP
659	1398	416	539	NSLNNFFETESCCVAQAGVQWRDLGSLQAPPPGFKRFSC
660	1399	281	736	KSLPLQKHPKPCQEDQGLGRGSLSGHSPLLTLTFLTSCALGD QQLLPRTSGSLCQESMSEQSCQMSELRLLLLGKCRSGKSATG NAILGKHVFKSKFSDQTVIKMCQRESWVLRERKVVIDTPDLF SSIACAEDKQRNIQHLLLSAP
661	1400	2	974	FVETTVSVQSAESSDALSWRLPRALASVGPEEARSAGAPVGGG RWQLSDRVEGGSPTLGLLGGSPSAQPGTGNVEAGIPSGRMLEP LPCWDAADLKEPQCPPGDRVGVQPGNSRVWQGTMEKAGLAWT RGTGVQSEGTWESQRQSDALPSPELLPQDQDKPFLRKACSPS NIPAVIITDMGTQEDGALEETQGSPRGNLPLRKLSSSSASSTG FSSSYEDSEEDISSDPERTLDPNSAFLHTLDQKPRVVESRSV TQAGVQWHDIGSLQPLPP/WIQAIL/HASAFRIAGTTGACHHA RIIFGFLVERGFHHVQDGLYLLIL
662	1401	232	3	KICSSYFLRIICTLQKEAQEASNLYTSCDFFSPAIFYFYIRLY NFKIHWPGAVAHTYSPSTLGGRGRWVT*GREFM
663	1402	250	556	LILSLPLLYGHLKSYTFPSEHYLHLLQTFFATFNKYLNVCLIF IHHKPVVPAIQGTNVGGSLEPRRLRLQQAMIVPLHFGNGRVR PCLKKQQQQQQQQQKK
664	1403	1	373	RMETKPVITCLKTLIIYSFVFWITGVILLAAAGVWGKLTLSY ISLIAENSTYAPYVLIVTGTTIVAYPLV*FFFSYSSGFSYILA VRLIAGIALVYNYIPRSSRALVRLVLLRFLSRHPS
665	1404	3	413	NAEHGPMDRHDLQCQAKLAEHAERDDDMAACMKTVTDQGAELS NEERNLLSDAHTNAV*ARRSSWMGA*RIEQKTEGADTQQQMAP DCREIFATELRDICCDDVLSLLEKLLIPNASHA*SLVYYLHMIG DYRYRWL
666	1405	2	334	GGGPLGKMPRAQLADPWQMMAVESPSDCADNGQQIMDEPMGED EISPQTE*VSIKEVAVTHCVKEGHDKADPSQIELLRVLRQGS GKVYLGKKVSGSDAKQLYAMKVLT

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667	1406	2	332	DAAGIRHEAHFGKLECLVQLVRAGA\SLFVSTTRYAQTPA\HT AAFGGHPQCLVWLIQAGANINKPDCEGETPIHKAARSGSLECI SALVANGAHVDNPKKGI RLVLEWLFE
668	1407	242	1157	LLKLMFIAELGDYDLAEHSPELVSEFRFVPIQTEEMELAI FEK WKEYRGQTPAQAE TNYLNKAKWLEMYGVDMHVVKARDGNDYSL GLTPTGVLVFE GDTKIGLFFWPKITRLDFKKNKLTLLVVEDDD QGKEQEHTFVFRLDHPKACKHLWKCAVEHHAFRLRGPVQKSS HRS GFIRLGSFRFRYSGKTEYQTTKTNKARRSTSFERRPSKRY S RRTLQMKACATKPEELSVHNNVSTQSNQSQQAWGMRSALPVSP S ISSAPVPVEIENLPQSPGTDQHDKWLSAASDCCQGGNQWN TRAL
669	1408	278	1	ATAPGLENFFF*FLFQCREEHKKKNPEVPVNF AEF SKKCSGRWK TMSSKEKFKFGEMAKADEVCYDREMKDYGPAGGKKKDPNAPK RPPSGF
670	1409	139	646	AELGSGWAVWAGLGWAGRHMEAGGATGALGVGSKLP S AFCFG SSVAMDMFQKVEKIGEGTYGVVYKAKNRETGQLVALKKIRLDL *VLGRPLSYPPWAITTWALPDFFLSWS PRLTPLGAAQQPLPV LSPVHCLLTSLCRGPDCGVWMT CQGAQVS IAGALVILWG
671	1410	3	442	LCVSVLCSFSYQLNGWTASDPVHG YWFR\AGDHVSRNIPVATN NPVRAVQEETRDRFHLLGDPQNKDCTLSIRD TRES DAGTYVFC VERGNMKWNYKYDQLSVNVTASQDLLSRYRLEVPE SVTVQEGL CVSVP/WQCPLPPLQLDCL
672	1411	84	836	QLQLCQNCTKRGECHCVPFDTYIKTKKEKKRLSVLPPTRLMEA RFSPINQILPWCRQDLAISISKAIN TQEAPVKEKHARRI ILGT HHEKGAFTFWSYAIGLPLPSSSILSWKFCHVLHKVLRDGHPNV LHDCQRYRSNIREIGDLWGHLH DRYGQLVNVYTKLLLT KISFH LKHPQFPAGLEV TDEVLEKAAGTDVNNM*VTLHGYMASSPRLP HSFLPRLTPRRPHGAVGLNESVALLVDAHAPRDRG
673	1412	307	664	AAPHRMPRAPHFMPLLLLLLLLLSLPHTQA AAFPQDPLPLISDL QGTSPLSWLPSLEDDAVAA*LGLDFQRFLT LNRTLLVAARDHV FSFDLQAE EEGEGLVPNKYLTWRSQDVENCAVR*KLT LNRTLL VAARDHVFSFDLQAE EEGEGLVPNKYLTWRSQDVENCAVR
674	1413	24	420	HLVPKTRGRGTPSGDQSPVLTLP*GD PPTILGPQTNPQKEHL TNFKSGKRSFHSLLQPLLLLLLHPSIS PFLNFGSFPFLVETEET CFIHKLKTPALVTPDSLPLVFNHCGDA CLI IHPHFRDVEFHHT GN

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675	1414	1	1101	CCSTKNISGDKACNLMIFDTRKTARQPNCYLFFCPNEEACPLK PAKGLMSYRIITDFPSLTRNLPSQELPQEDSLHQQFSQAVTP LAHHHTDYSKPTDISWRDTLSQKFGSSDHLEKLFKMDDEASAQL LAYKEKGHSQSSQFSSDQEIHLHPENVSAIPATVAVASPHTT SATPKPATLL\PTNASVTPSGTSQPQLA\TTAPPVTTVTSQPP TTLISTVFTRAAATLQAMATTAVLTTFQAPTDSKGSLETIPF TEISNLTNTGNVYNPTALSMSNVESSTMNKTASWEGREASPG SSSQGSVPENQYGLPFKWLIGSLLFGVLFVLVIGLVLLGRIL SES LRKRYSRLDYLINGIYVDI
676	1415	178	621	IFAGSGVMRLKISLLKEPKHQELVSCVGWTTAEELYSCSDDHH IVKWNLLTSETTQIVKLPDDIYPIDFHWFPKSLGVKKQTHAES FVLTSDDGKPHLISKLRVEKSVEAHCGAVLAGRWNYEGTALV TVGEDGQI*IWSKTGMLIS
677	1416	1258	944	ARATTKRHFILLFLFFLRRC\LFLSPRMECNGAILAHCNLHLP GSSSSSASAS*VAGITDVRHHAQLILFVFLVETGFHRVQGAGL KLLTSGDLLTSASQSAGIIMGISHCAQPKKAF*TKTF
678	1417	876	1291	EAGSNDDLAT*KTCGRARPSSRSRQFGSRVWNHRQGVRRSSPGE GAGSRSPCRRRHRRKHRRNVQSP*RRRSRSCSRSSGRCSVALL GACPVAGHSRGKVVCRAHAITQRRRCGFDPMVHPKEHRG*R ERSRKWSRS
679	1418	262	539	ATAPGLFNFF*FLFQCREEHKKKNPEVPVNFAEFSKKCSGRWK TMSSKEKFKFGEMAKADEVCYDREMMDYGPAGGKKKDPNAPK RPPSGF
680	1419	104	236	LTVNYVLVFSRDSGLRAIENLMQKKGKFYILLETGLADPGK K
681	1420	3	277	HEAALCRTRAVAAERHFLRVFLFRPFRGVGTESGSESGSSKA KEPRTPTSSSYGTAQYRRWPIAQEYKHCTAHNDTGTLCSELREP WRRPQ
682	1421	3	576	EGSSQANTLRSRKENRNLLACLES HVLR*QFTESHLCSLMGD NPFQPKSNSKMAELFMECEEELEPWQKKVKEVEDDDDEPIF VGEISSSKPAISNILNRVNPSSYSRGLKNGALSRGITAAFKPT SQHYTNPTSNPVPASPINFHPESRSSDSSVIGQPFKPVSVSK TIRPAQGSIGCCLISITV
683	1422	6	627	CFSLEDILNFFLQGFSAGLFAFYHDKDGNPLTSRFADGLPPFN YSLGLYQWSDKVVRKVERLWDVRDNKIVRHTVYLLVTPRVVEE ARKHFDPCVLEGMELNQGGVGTENLHWEKRLLENEAMTGSHT QNRVLSRITLALMEDTGRQMLSPYCDTLRSNPLQLTCRQDQRA VAV\CNLQKFKPLPQEQYQYFDELSGIPAEDLPYYG

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684	1423	1	1272	AARRRRQLVSRRRTAE\YPRRRRSSPSARPPDPVPGQQPKAAKS PSPVQGGKSPRLLCIEKVTTDKDPKKEEKEEEDDSALPQEVSI ASRPSRGWRSSRTSVSRHRDTENTRSSRSKTGSLQLICKSEPN TDQLDYDVGEEHQSPGGISSEEEEEEEEEMLISEEEIIPKDDP RDETYKPHLERETPKPRRKSGKVKEEKEKKEIKVEVEVEVKKE ENEIREDEEPPRRKGRRRKDDKSPRLPKRRKKPPIQYVRCME GCGTVLAHPRYLQHHIKYQHLLKKKYVCPHPSCGRFLRLQKQL LRHAKHHTDQRDYICEYCARAFKSSHNLAVHRMIHTGKPLQC EICGFTCRQKASLNWHMKHDADSIFYQFSCNICGKKFEKKDSV VAHKAKSHPEVLIAEALANAGALITSTDILGTNPES
685	1424	56	526	MTANRLAESLLALSQQEELADLPKDYLLSESEDEGDNDGERKH QKLEAIISSLDGKNRRKLAERSEASLKVSEFNVSSEGSGEKLV LADLLEPVKTSSSLATVKKQLSRVSKKTVELPLNKEEIERIH REVAFNKTAQVLSKWDPVVLKNRQAEQL*
686	1425	132	344	RIDFMFHSSAMVNSHRKPMFNIHRGFYCLTAILPQICICSQFS VPSSYHFTEDPGAFPPVATNGERFPWQELRLPSVVIPLHYDLFV HPNLTSLDVFVASEKIEVLVSNAQTLLIHSKDLEITNATLQSE EDSRYMKPGKELKVLSYPAHEQIALLVPEKLTPLHKYVAMDF QAKLGDGFEGFYKSTYRTLGGETRILAVTDFEPTQARMAFP CFDEPLFKANFSIKIRRESRHIALSNMPKVKTIELEGGLLEDHFE TTVKMSTYLVAYI/DL*FPLMGNDLGRS
687	1426	3	678	RSKIPRSDPRVTPAPAEAEQKSKQCPGSGSTAQSWSAMDI LLQLLVLLLTPLPLHMLLGCWQPLCKSYFPYLMVLT PKSNRKMESKKRELFSQIKGLTGASGKVALLELGC GTGANFQFYPPGC RVTCLDPNPHFEKFLTKSMAENRHLQYERFV VAPGEDMRQLAD GSM DVVCTLVLCVQSPRKVLQEVRRVLRPGGV LFFWEHVAE PYGSWAFMW
688	1427	240	641	RLQNSSLMDPKLGRMAASLLAVLLLLLLERGMFSSPSPP PALL EKVFQYIDLHQDEFVQTLKEWVAIESDSVQPVPRFRQEL FRMM AVAADTLQRLGARVASVDMGPQQLPDGQSLPIPPVILAE LGS DPTKG
689	1428	1	116	FFFFEMESCSVTQAGVPWHDLSLQPPPPRFRKFSCLS
690	1429	75	511	DPKAQLPEPLRVLWTAHLVAMAPGSRTSLLAFALLCLPWLQ E AGAVQTVPLSRLFDHAMLQAHRAHQLAIDTYQEFEE TYIPKDQ KYSFLHDSQTSFCFSDSIPTPSNMEETQQKSNLELLRIS LLLI ESWLEPVRIILMSIVPN

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691	1430	2	1364	FVKLIKKHQAAMEKEAKVMSNEEKKFQOHIQAQQKKELNSFLE SQKREYKLRKEQLKEELNENQSTPKKEKQEWLSKQKENIQHFQ AEEANLLRRQRQYLELECRFRKRRMLLGRHNLEQDLVREELN KRQTQKDLHAMLLRQHESMQELEFRHLNTIQKMRCELIRLQH QTELTNQLEYNKRRERELRRKHVMEVRQQPKSLKSKELQIKKQ FQDTCKIQTRQYKALRNHLLLETPKSEHKAVLKRLKEEQTRKL AILAEQYDHSINEMLSQALRLDEAQEABCOVLKMQLQOQLEL LNAYQSKI KMQAQAHDRELRELEQRVSLRRALLEQKIEEEML ALQNERTERIRSLERQAREIEAFDSESMRLGFSNMVLSNLSP EAFSHSYPGASGWSHNPTGGPGPHWGHMGGPPQAWGHPMQGG PQPWGHPS\GPMQ\GVPR/GSSMGVR
692	1431	50	504	LAHGSFGVSDFFPAPAAAPAHTLTSFSGSLSPQFRKPLGRAPAM PLVRYRKVVILGYRCVGKTS LAHQFVEGEFSEGYDPTVENTYS KIVTLGKDEFHLHLVDTAGQDEYSILPYSFIIGVHGYVLVYSV TSLHSFQVIESLYQKLHEGHGK
693	1432	130	1671	SSPSRELFCYGFWFIASSWWSRWVGSILGPGILPSPARGRTFAS VSRLPPWSAGITLTPFLICQSGSVCPGLGAGFGVRSFHHHPVA RSAVLLLPLAPAAAQDSTQASTPGSPLSPTEYERFFALLTPTW KAETTCRLRATHGCRNPTLVOLDQYENHGLVPDGA VCSNLPYA SWFESFCQFTHYRCSNHVYAKRVLCSQPVSILSPNTLKEIEA SAEVSPTMTSPISPHTVTERQTFQPWPERLSNNVEELLQSS LSLGGQEQAPEHKQEQQGVEHRQEPTQEHKQEEGQKQEEQEEQ EEEGKQEEGQGTKEGREAVSQLQTDSEPKFHSESLSSNPSSFA PRVREVESTPMIMENIQELIRSAQEIEMNEIYDENS YWRNQ PGSLLQLPHTTEALLVLCYSIVENTCIIPTAKAWKYMEEIILG FGKSVCDSLGRRHMSTCALCDFCSLKLEQCHSEASLQRQCCDT SHKTPFVSPLLASQSLSIGNQVGSPESGRFYGLDLYGGLHM
694	1433	517	578	VSWVPSKGDVEGARRPFTRLNTSLGPGQLQEGRRRTWLVPPIPG AVLPGRTQEQRASPLY*PGAPPCQPQGLVAGPWAQ*AGLRSD GFGPWPW\RLVGTAGPREKKVQKSKCWHFRGRHPARRSGWAG RHASLLATGRPCSSAPSQQPLGTAGDSRQELLRPPLV*VNGAQ SSAAGDWGSSPRTAQALARPHRLGHHFAAVAPAAARLRTQSGHS PRGPLCRSPGSPRRMGTWRGPAGHSHD
695	1434	249	632	KTVAEEASVGNPEGAFMKMLQARKQHMSTELTIESEAPSDSSG INLSGFGSEQLDTNDES DVSSALS YILPYLSLRNLGAESILLP FTEQLFSNVQDGRLLSILKNNRKSPSQSSLLGNKFKNKIF
696	1435	333	881	GE CFIMAAVVQNDLVFEFASNVMEDERQLGDPATFFAVIVEH VPGADILNSYAGLACVEEPNDMITESSLDVAEEIIDD DDDDI TLTVEASCHDGETIETIEAAEALLNMDSPGPMLEKRIINNII FSSPEDDMVAVPTHVSVTL DGIPEVMETQQVQEKYADSPGAS SPEQPKRKKK

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697	1436	3	466	HEASGVSRRALLQSAPGTPATVGVISVGELWPFARCCSHSYVRSR RGLSVSTHLLCFTIYIMNPSMKQKQEEIKENIKTSSVPRRTLK MIQPSASGSLVGRENELSAGLSKRKHRNDHLTSTTSSPGVIVP ESSENKNLGGVTQESFDLMIKGMKK
698	1437	50	241	PLPARGKSTLPATFCSPSAPELASMSVPPNRSQTGWPRGVTO FGNKYIQQTKPLTLERTINL
699	1438	1	422	AEGEDVPPPLPTSSGDGWEKDLLEALEAGGCDELTLRNIIQGRP LPADLRKVWKIALNVAGKGDLSLAWDGLDLPEQNTIHKDCL QFIDQLSVPEEKAAELLLDIESVITFYCKSRNIKYSTSLSWIH LLKPLVHLQLP
700	1439	161	413	ALPKFLTHGVKSNERVVVWLFPPSFRAATMVHMNVLPDALKSI NNAERRGKPOVLIRLCSKIIWFLTMVKYGYIGKFEPTRP
701	1440	211	977	AMAQYGHPSPLGMAAREELYSKVTPRRNRQQRPGTIKHGSALD VLLSMGFPRARAQKALASTGGRSVQAACDWLFSHVGDPPFLDDP LPREYVLYLRPTGPLAQKLSDFWQQSKQICGKNKAHNIFPHIT LCQFFMCEDSKVDALGEALQTTVSRWKCKFSAPLPLELYTSSN FIGLFVKEDSAEVLKKFAADFAAABAASKTEVHVPEPHKQLHVT LAYHFQASHLPTLEKLAQNIDVKLGCDWVATIFSRDIRFA
702	1441	3	408	QTRPASPRTARESVLGVSQNMSFNLQSSKKLFI FLGKSLFSL EAMIFALLPKPRKNVAGEIVLITGAGSGLGRLLALQFARLGSV LVLWDINKEGNEETCKMAREAGATRVHAYTCDCSQKEGVYRVA DQVKK
703	1442	708	244	MVARKGQKSPRRRVTCFLRLGRSTLLELEPAGRPCSGRTRHR ALHRRLLVACVTVSSRRHRKEAGRRAESFIAVGMAAPSMKERO VCWGARDEYWKCLDENLEDASQCKKLRSSESSCPQQWIKYFD KRRDYLKFKEKFEAGQFEPSETTAKS
704	1443	3	475	PAPAARSRELLKELRNGQDMDTVVFEDVVVDFTLEEWALLNPA QRKLYRDVMLETFKHLASVDNEAQLKASGISQQDTSGEKLSL KQKIEKFTRKNIWASLLGKNWEEHSVKDKHNTKERHLSRNPRV ERPCKSSKGNKRGRTRFRKTRNCNRHLRR
705	1444	276	437	CVCGFFVCFETKSCFVAQAGVQWHNLSLQALPPGFKQFSCLS LLSSWHYRRV
706	1445	2	322	GTRLRRRREAVWFVVNMDFSRLHMYSPQCVPTENTGYTYALS SSYSSDALDFETHEKLDPVFDSPRMSRRSLRLATTACTLGDE AVGADSGTSSAVSLKNRAAR
707	1446	123	410	DTMQAVVPLNKMTAISPEPQTLASTEQNEVPRVVTSGEQEAIL RGNAADAESFRQRFRWFCYSEVAGPRKALSQWLWELCNQWLRPD IHTKE\QILE
708	1447	2	384	PICLFSRPTLRPSRSKVSLEIEGRGANMAARWRFWCVSVTMVVA LLIVCDVPSASAQRKKEMVLSEKVSQLMWETNKRPIRMNGDK FRRLVKAPPRNYSIVMFTALQLHRQCVVCKYELQLRFKIK



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709	1448	104	535	QMRVKDPTKALPEKAKRSKRPTVPHDEDEDSSDDIAVGLTCQHVS HAISVNHVKRAIAENLWSVCSECLKERRFYDGQLVLTSDIWLC LKCGFQGCCKNSSESHSLKHFSSRTEPHCIIINLSTWIIWWY EWDEKIFTPLNKKG
710	1449	116	479	AKERGEERQGEGLGSLGSRWPLVRSFVFPAPSSLLISMCLSP GIPEAAPDSPLTASATP*VMLLGGDTGVGKTCFLIQFKDGAFL SGTFIATVGIDFRVRWLQALASSREPGLWLRHGGV
711	1450	2	232	FYPRSSADLPFQTTRCEFTQTSVMELASHLLNNEEALAQITEAK RPVFIFEWLRFDLKVLVAANKVWYCSFFPVALT
712	1451	105	393	MNMKQKSVYQQTKALLCKNFKKWRMKRESLLEWGLSILLGLC IALFSSSMRNVQFPGMAPQNLGRVDKFNSSSLMVVYTPISNLT QQIMNKTAL
713	1452	2	525	SPQNGCPDVTGDSVIRVPLTLLVHNLAGLTGLLHHCLSGPLP APSPPPAMSSSRKDHGLGASSSEPLVIVGNGPSGICLSYLLS GYTPYTKPDIAHPHLLQRKLTEAPGVSILDQDLDSLSEGLEG RSQSPVALLFDALLRPDPTDFGGNMKSVLTWKHRKEHAIPHVVL GR
714	1453	2	1557	NRRTAQRQCRGRSCGAREEEVEPGTARPPPAASAMDASLEKI ADPTLAEMGKNLKEAVKMLEDSSQRTEEEENGKKLISGDIPGPL QSGSQDMVSIQLVQNLMHGDEDEEPQSPRIQNIQEQQHMALL GHSLGAYISTLDKEKLRKLTTRILSDTTLWLCRIFRYENGCA FHEEEREGLAKICRLAIHSRYEDFVVDGFNVLYNKKPVIYLSA AARPGGLGQYLCNQLGLPFPCLCRVPCNTVFGSQHQMDFAFLEK LIKDDIERGRLPLLLVANAGTAAVGHDKIGRLKELCEQYGIW LHVEGVNLTALALGYVSSSVLAAKCDSTMTPGPWLGLPAVP AVTLYKHDDPALTLVAGLTSNKPTDKLRALPLWLSLQYLGLDG FVERIKHACQLSQRLQESLKKVNYIKILVEDELSSPVVFRFF QELEGSDPVFKAVPVPNMTPSGVGRERHSCDALNRWLGEQLKQ LVPASGLTVMDLEAEGTCLRFSPMLTAAGKPGLVDIPCFCSGA AG
715	1454	319	873	LCIMDTKEEKKERKQSYFARLKKKQAKQNAETASAVATRTH GKEDNNTVVLEPDKCNIAVEEEYMTDEKKRKSQNLKEIRRTE LKRYYSIDNQNKTHDKKEKKMVVQKPHGTMEYTAGNQDTLNS IALKFNTIPNKLVELNKLFTHTIVPGQVLFVPDANSPTSSTLRL SSSSPGATVSPSS
716	1455	60	681	SAGGDS CRAVPMLRFPTCFPSFRVVGKQLPQEIIIFLVWSPKR DLIALANTAGEVLLHRLASFHRVWSFPNENTGKEVTCLAWRP DGKLLAFALADTKKIVLCDVEKPESLHFSFVEAPVSCMHWMEV TVESSVLTSFYNAEDESNNLLPKLPTLPKNYSNTSKIFSEENS DEIKLLGDVRLNILVLGGSSGFIELYAYGMFKI
717	1456	357	658	PRDPVTDARAMPRRGLVAGPDLEYFQRHYFTPAEVAQHNRPE DLWVSYLGRVYDLTSLAQEYKGNLLLPIVEVAGQDISHWFD KTRDVS YAGTWDCG

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718	1457	2	481	RIPGRRFRAAFVLGSANVASSVRLRCSFPLSLGGPSGPAAASV ALGPAGPGRSLGRTPDTGDWEMDSVSFEDVAVFTQBEWALLD PSQKNLYRDVMQEI FRNLASVGNKSEDNITQDDFKNPGRNLSS HVVERLFEIKEGSQYGETFSQDSNLNLNKI
719	1458	6	469	SLSLSVSPFLRLSLGRVGGMAEEMESSLEASFSSSGAVSGASG FLPPARSRIFKIIVIGDSNVGKTCLTYRFCAGRFPDRTEATIG VDFRERAVEIDGERIKIQLWDTAGQERFRKSMVQHYRNVHAV VFVYDMTNMASFHSLSWIEECKQH
720	1459	82	490	RRSPGSIIVIMAESDVLHFQFEQQGDVVLQKMNLLRQONLFC DVSIIYINDTEFQGHKVILAACSTFMRDQFLLTQSKHVRITILQ SAEVGRKLLLSCTGALEVKRKELLKYLTAASYLQMVHIAEKR TEAFVKF
721	1460	48	708	AEGLQSAAGIRIDTKAGPPEMLKPLWKA AVAPTWPSCMPRRP WDRQAGTLQVLGALAVLWLGSAVALICLLWQVPRPPTWQGVQPK DVPRSWEHGSSPAWEPLAEAEARQORDSCQLVLVESIPQDLPSA AGSPSAQPLGQAWLQLLDTAQESVHVASYYWSLTGPDIGVND SSQLGEALLQKLQQLLGRNISLAVATSSPTLARTSTDLQVLAA RGAH
722	1461	436	677	RKKKMPLPFGLKLKRTRYTVSSKSLVARIQLLNNEFVEFTL SVESTGQESLEAVAQRLELREVITYFSLWYYNKQNQR
723	1462	45	569	LQPLSSWESASEVTRSPVSPEDVKQATSNFENLQKQLARKMKL PIFIADAFTARAFRGNPAAVCLLENELDEDMHQIAREMNLSE TAFIRKLHPTDNFAQSSCFGLRWFTPASEVPLCGHATLASAAV LFHKIKNMNSTLTFTVLSGELRARRAEDGIVLDLPLYPAHPQD FHE*
724	1463	79	530	AADTMQSDDDVIWDTLGNKQFCSEFKIRTKTQSFRCRNEYSLTGLC NRSSCPLANSQYATIKEKGQCYLYMKVIERAAFPRLWVERVR LSKNYEKALEQIDENLIYWPRFIRHKCKQRFTKITQYLIRIRK LTLKRQRKLVPPLSKKVERREK
725	1464	2	261	FVERGLGDPALPTLMFEEPEWAEAAPVAAGLGPVISRPPPAAS SQNKVSDSREQWELFQAAKRTLVDPSAVCIAGRDTCTGTVKGES
726	1465	1	860	VVEFLWSRRPSSGSDPRPRRPASKCQMMEERANLMHMKLSIK VLLQSALSLGRSLDADHAPLQQFFVVMHCLKHGLKVKKSPFIG QNKSFPGPLELVEKLCPEASDIATSVRNLPKLTAVGRRAWL YLALMQKKLADYLKVLIDNKHLLSEFYEPALMMEEGMVIVG LLVGLNVLDANL\CLKGEDLDSQVGVIDFSLYLKDVQDLGGK EHERITDVLQKNYVEELNRHLSCTVGDQLTKIDGLEKTNSKL QERVSAATDRICSLQEEQQQLREONELIR
727	1466	69	452	GCYAPSPHLGGSLTPRFFPNGVFHRRLRPRPPQPPSVSSAPT LRPLCAHFSGLKRLRVRKSAEVAPPRTTEKGWGSAPRHSRAP LGLQGLRMAASAQVSVTFEDVAVTFTQEEWGQLDAAQRTLY

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728	1467	1	439	FRGSLSSPSSLRGRRLVTGQTSRGTWCLYPGFCRSVACAMPC CSHRSCREDPGTSESREMDPVVFEDVAVNFTQEEWTLDDISQK NLFREVMLETFRNLTSIGKKWSDQNIYEYQNPRRSFRSLIEE KVNIEIKEDSHCGETFQ
729	1468	103	236	LNFAASAFAVTMPQNEYIELHRKRYGFRLDYHEKRRKKQSRE A
730	1469	213	809	SGDLSPAELMMLTIGDVIKQLIEAHEQGKDIDLNKVKTKTAAK YGLSAQPRRLVDIIAAVPPQYRKVLMPKLKAKPIRTASGIAVVA VMCKPHRCPHISFTGNICVYCPGGPDSDFEYSTQSYTGYEPTS MRAIRARYDPFLQTRHRIEQLKQLGHSVDKVEFIEMGGTFMAL PEEYRDYFIRNLHDALSGHTSNNIYE
731	1470	264	799	WESDVGEGLRPPPPPPPPGRRRTQEPARDAATVIFACPAALL ETLIAYGSSSPSFCKHRAARPLIFLLHRLTAETARCPICAL EARNPGRWGICASWPGMKT PFGKAAAGQSRRTGAGHGSVVTMI KRKAHKKHRSRPTSQPRGNIVGCI IQHGWKDGDPELTQWKGT VLDQLL
732	1471	2	763	RDLGVALEAFQWARAGDCGSGAGRAGGEGVDAGRRVPERQHRG RGGGGEGPGRRQRGGRQ\RSSRRSGGDDGGDEVEGSGVGAGEG ETVQHFPPLARPKSLMQKLQCSFQTSWLKDFPWLRYSKDTGLMS CGWCQKTPADGGSVDLPPVGHDELSRGTRNYKKTLLLRHHVST EHKLHEANAQSESEIPSEEGYCDFNSRPNENSICYQLLRQLEQ RKKGILCDVSI VVSGKIFKAHKNILVAGSRFFKTLYCFS
733	1472	82	523	SLRAAAMADV TARSLQY EYKANSNLVLQADRSLIDRTRDEP TGEVLSLVGKLEGTRMGDKAQRTPQMQUEERRAKRRKRDEDRH DINKMKGYTLLSEGIDEMVGIIYKPKTKETRETIEVLLSFIQA ALGDQPRDILCGAADEVL
734	1473	536	110	CNSAESRMDVLFVAIFAVPLILGQYEDEERLGEDEYYQV VYY YTVTPSYDDFSADFTIDYSIFESEDRNLNRDKDITEA IETTIS LETARADHPKPVTVKPVTTPEQSP\DL\NDAVSS\LRSPIPL\ LLS\CAFVQVGM YFM
735	1474	2	557	FVRGPGEQAPAFRKPA PGAMGAQVRLPPGEP CREGYVLSLVC PNSSQAWCEITNVSQLLASPVLYTDLNYSINNLSISANVENKY SLYVGLVLAVSSSIFIGSSFILKKKGLLQLASKGFTRAGQGGH SYLKEWLWWVGLLSILSWNAREKVDL*NITF*PQTS CIFTIT IEKSTFLSYFPTS
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SEQ ID NO: of Nucleic Acids	SEQ ID NO: of Amino Acids	Predicted beginning nucleotide location corre- sponding to first amino acid residue of amino acid sequence	Predicted end nucleotide location corre- sponding to first amino acid residue of amino acid sequence	Amino acid segment containing signal peptide (A=Alanine, C=Cysteine, D=Aspartic Acid, E= Glutamic Acid, F=Phenylalanine, G=Glycine, H=Histidine, I=Isoleucine, K=Lysine, L=Leucine, M=Methionine, N=Asparagine, P=Proline, Q=Glutamine, R=Arginine, S=Serine, T=Threonine, V=Valine, W=Tryptophan, Y=Tyrosine, X=Unknown, *=Stop Codon, /=possible nucleotide deletion, \=possible nucleotide insertion)
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## WHAT IS CLAIMED IS:

1. An isolated polynucleotide comprising a nucleotide sequence selected from the group consisting of SEQ ID NO: 1-739, a mature protein coding portion of SEQ ID NO:1-739, an active domain of SEQ ID NO: 1-739, and complementary sequences thereof.
2. An isolated polynucleotide encoding a polypeptide with biological activity, wherein said polynucleotide hybridizes to the polynucleotide of claim 1 under stringent hybridization conditions.
3. An isolated polynucleotide encoding a polypeptide with biological activity, wherein said polynucleotide has greater than about 90% sequence identity with the polynucleotide of claim 1.
4. The polynucleotide of claim 1 wherein said polynucleotide is DNA.
5. An isolated polynucleotide of claim 1 wherein said polynucleotide comprises the complementary sequences.
6. A vector comprising the polynucleotide of claim 1.
7. An expression vector comprising the polynucleotide of claim 1.
8. A host cell genetically engineered to comprise the polynucleotide of claim 1.
9. A host cell genetically engineered to comprise the polynucleotide of claim 1 operatively associated with a regulatory sequence that modulates expression of the polynucleotide in the host cell.
10. An isolated polypeptide, wherein the polypeptide is selected from the group consisting of:

- (a) a polypeptide encoded by any one of the polynucleotides of claim 1; and
  - (b) a polypeptide encoded by a polynucleotide hybridizing under stringent conditions with any one of SEQ ID NO:1-739.
11. A composition comprising the polypeptide of claim 10 and a carrier.
12. An antibody directed against the polypeptide of claim 10.
13. A method for detecting the polynucleotide of claim 1 in a sample, comprising:
- a) contacting the sample with a compound that binds to and forms a complex with the polynucleotide of claim 1 for a period sufficient to form the complex; and
  - b) detecting the complex, so that if a complex is detected, the polynucleotide of claim 1 is detected.
14. A method for detecting the polynucleotide of claim 1 in a sample, comprising:
- a) contacting the sample under stringent hybridization conditions with nucleic acid primers that anneal to the polynucleotide of claim 1 under such conditions;
  - b) amplifying a product comprising at least a portion of the polynucleotide of claim 1; and
  - c) detecting said product and thereby the polynucleotide of claim 1 in the sample.
15. The method of claim 14, wherein the polynucleotide is an RNA molecule and the method further comprises reverse transcribing an annealed RNA molecule into a cDNA polynucleotide.
16. A method for detecting the polypeptide of claim 10 in a sample, comprising:

- a) contacting the sample with a compound that binds to and forms a complex with the polypeptide under conditions and for a period sufficient to form the complex; and
- b) detecting formation of the complex, so that if a complex formation is detected, the polypeptide of claim 10 is detected.

17. A method for identifying a compound that binds to the polypeptide of claim 10, comprising:

- a) contacting the compound with the polypeptide of claim 10 under conditions sufficient to form a polypeptide/compound complex; and
- b) detecting the complex, so that if the polypeptide/compound complex is detected, a compound that binds to the polypeptide of claim 10 is identified.

18. A method for identifying a compound that binds to the polypeptide of claim 10, comprising:

- a) contacting the compound with the polypeptide of claim 10, in a cell, under conditions sufficient to form a polypeptide/compound complex, wherein the complex drives expression of a reporter gene sequence in the cell; and
- b) detecting the complex by detecting reporter gene sequence expression, so that if the polypeptide/compound complex is detected, a compound that binds to the polypeptide of claim 10 is identified.

19. A method of producing the polypeptide of claim 10, comprising,

- a) culturing a host cell comprising a polynucleotide sequence selected from the group consisting of a polynucleotide sequence of SEQ ID NO: 1-739, a mature protein coding portion of SEQ ID NO: 1-739, an active domain of SEQ ID NO: 1-739, complementary sequences thereof and a polynucleotide sequence hybridizing under stringent conditions to SEQ ID NO: 1-739, under conditions sufficient to express the polypeptide in said cell; and
- b) isolating the polypeptide from the cell culture or cells of step (a).

20. An isolated polypeptide comprising an amino acid sequence selected from the group consisting of SEQ ID NO: 740-1478, the mature protein portion thereof, or the active domain thereof.
21. The polypeptide of claim 20 wherein the polypeptide is provided on a polypeptide array.
22. A collection of polynucleotides, wherein the collection comprises the sequence information of at least one of SEQ ID NO: 1-739.
23. The collection of claim 22, wherein the collection is provided on a nucleic acid array.
24. The collection of claim 23, wherein the array detects full-matches to any one of the polynucleotides in the collection.
25. The collection of claim 23, wherein the array detects mismatches to any one of the polynucleotides in the collection.
26. The collection of claim 22, wherein the collection is provided in a computer-readable format.
27. A method of treatment comprising administering to a mammalian subject in need thereof a therapeutic amount of a composition comprising a polypeptide of claim 10 or 20 and a pharmaceutically acceptable carrier.
28. A method of treatment comprising administering to a mammalian subject in need thereof a therapeutic amount of a composition comprising an antibody that specifically binds to a polypeptide of claim 10 or 20 and a pharmaceutically acceptable carrier.



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caagcaatgc taggttcttc acgtacggta attttccctt agaccagcat      890

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<210> 12
<211> 982
<212> DNA
<213> Homo sapiens

<220>
<221> misc_feature
<222> (1)...(982)
<223> n = a,t,c or g

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<400> 12
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cctaccctcc ttcccacccc ccaccacacc cgctcaccag ctccgctact gctcgctccg      180
gctgcgcgcg ccgcgcgcgc cgacgccacc accactgctt cctctgctgc ggggccacag      240
ccttgagtgt cattcaaggg acagcacaac ctcatccaag ctctcctacc tctgccagc      300
cgtgcctctc atcctcccca ttctctgtcc acactccatc caaagaagag ggaaagcacc      360
gaatagaggg gggcgaaggc aaagtctgct gttcttcccc ctgggcccc ttgctcctcc      420
atcctcatte tctcaccacc agcccccta accccaagga gcccaggaac tgaggcgact      480
cgccccactg ccatgtccaa aagcttgaaa aagaaaagcc actggactag caaagtccat      540
gagagtgtca ttggcaggaa cccggagggc cagctgggct ttgaactgaa ggggggcgc      600
gagaatggac agttccccta cctgggggag gtgaagcccg gcaaggtggc ctatgagagc      660
ggcagcaaat tgggtgcgga ggagctgctg ctggaggtga acgagacccc cgtggcgggg      720
ctcaccatca gggacgtgct ggccgtgatc aaacactgca aggaccccct ccggctcaag      780
tgtgtcaagc aaggtgagag cagcggcttg ctcagtgttt tgccgggcgg tgggaccgct      840
cggggcgcag ggcaatgaaa ggggtggccgc gcatgttgaa ggggggtgtg tgccgatga      900
tggggtgggg gccagagagc accgcagtg caagtgaagt tcgccgggga ttccagcaaa      960
tcgtnncccg ggaattccgg ac

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<210> 13
<211> 440
<212> DNA
<213> Homo sapiens

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<400> 13  
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 gccagtcttt tggtaagaac tagtcacaca gacctcaacc tgatgcgtgg agacaaggaa 180  
 atgcttttca gtgtgtccag aaagagaaaa tgcagggtgc ttctgcggag gtgcgcacgc 240  
 ggcccatgag actgacgcag gacctattc aggttttgct gatctttgca aaggaagata 300  
 gtcagagcga tggcttctgg tgggcctgcg acagagctgg ttatagatgc aatattgctc 360  
 ggactccaga gtcagccctt gaatgctttc ttgataagca tcatgaaatt attgtaattg 420  
 atcatagaca aactcagaac 440

<210> 14  
 <211> 581  
 <212> DNA  
 <213> Homo sapiens

<400> 14  
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 cccaggaact gcccggggag catcgtgcag ggcgtctgcg gctgctgcta cacgtgcgcc 180  
 agccagagga acgagagctg cggcggcacc ttccgggattt acggaacctg cgaccggggg 240  
 ctgcgtttgtg tcatccgccc ccgctcaat ggcgactccc tcaccgagta cgaagcgggc 300  
 gtttgcgaaag atgagaactg gactgatgac caactgcttg gttttaaac atgcaatgaa 360  
 aaccttattg ctggctgcaa tataatcaat gggaaatgtg aatgtaaac cattcgaacc 420  
 tgcagcaatc cctttgagtt tccaagtcag gatattgtgc ttccagcttt aaagagaatt 480  
 gaagaagaga agccagattg ctccaaggcc cgctgtgaag tccagttctc tccacgttgt 540  
 cctgaagatt ctgtttctgat cgaggggttat gtcctcctcg g 581

<210> 15  
 <211> 693  
 <212> DNA  
 <213> Homo sapiens

<400> 15  
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 gagcagtcga gaaagcggct tatcgaaacag agccgggagt tcaagaagaa cactccagag 180  
 gtgaggcgcg tgaccatcgt gttcgctttg aagggatctt agaatgctgg tgcattgtca 240  
 ggcgacgctc cgtgagcgtt tcattttcat cagatgaacg cacggccggc aaacaacccg 300  
 tttctttccc cagatgtctt cagccccatt tccagcagaa cgcatgccat cctgcaggct 360  
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 gcagatactg gacaagcttg gtctgtaaga acacgtgggc aggtgtgtgg gtgtctcaaa 480  
 cctcagagct catcccagac cctgtcccat gtcagtttagc aagccaccaa agtccataag 540  
 ggatcctgtg ggggtggaagg tccgcggggc ctgcttccct gttgctggtg caggcggagt 600  
 gtctgaaggc tgcaacgcac tgggcatagc agtgcgccta acgcttcttg taaaacagac 660

atttcgcctg ctaagccttt taaatgcctc tct

693

<210> 16  
 <211> 562  
 <212> DNA  
 <213> Homo sapiens

<400> 16  
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 ttcacctaag attgagacct agtgactaca ttctctacgg gaacaaataa atgggtttttc 180  
 atctcccggg gatacattac aaacaaatat ggtgctaaaa gaactcctta cctttctctg 240  
 actacaattt atttggacat acttttgtat tgaagagagg tatacatact gaagctactt 300  
 gctgtactat aggagactct gtcctgtagg atcatggacc atcctagtag ggaaaaggat 360  
 gaaagacaac ggacaactaa acccatggca caaaggagtg cacactgctc tgcaccatct 420  
 ggctcctcat cgctcctctgg ggttcttatg gtgggaccca acttcagggt tggcaagaag 480  
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 tttaggaccat gtgggaaata ta 562

<210> 17  
 <211> 899  
 <212> DNA  
 <213> Homo sapiens

<400> 17  
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 attgcttggc ttcattctcat agatccataa cttatcacc ttgtggactt aattcctcca 180  
 tgcctcagtt tatcacttat gtaggcttaa ttctccatg cctcagtttc cctacatata 240  
 aaatggaaat actaataaca cttatcttgt aggggttgtt taaagattaa catagtggag 300  
 tcattgggog aagctgggoc atgctgtttg ccagtggagg cttccagggt aaactctatg 360  
 acattgagca acagcagata aggaatgcc tggaaaacat cagggtgggoc agccggcgct 420  
 ctccagaagg aatggaagtg ggtctgtttc tctcagttgg tcttggtttgt catatcctca 480  
 aggctatgag gatctgtgat gtcacatttt cgtctgatgg ctactgcagt gcctctgagt 540  
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 agaggtcctg cagcttgttt tgacctgttg atctagtaat ggtaggacct aaatgaaaac 840  
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<210> 18  
 <211> 519  
 <212> DNA



&lt;213&gt; Homo sapiens

&lt;400&gt; 18

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ccagagggat	ggtggtagtc	acggggcggg	agccagacag	ccgtcgtcag	gacggtgcca	120
tgtccagctc	tgacgcccga	gacgactttc	tggagccggc	cacgcccagc	gccacgcagg	180
cggggacgc	gctgcccctg	ctgccacagg	agtttctga	ggttggtccc	cttaacatcg	240
gaggggctca	cttactaca	cgcctgtcca	cactgcgggtg	ctacgaagac	accatgttgg	300
cagccatggt	cagtgggcgg	cactacatcc	ccaoggactc	cgagggcggg	tacttcatcg	360
accgagatgg	cacacacttt	ggagatgtgc	tgaatttcct	gcgctcaggg	gacctccac	420
ccaggagcgg	tgttcgagct	gtgtacaaag	aggcccagta	ctatgccatc	gggcccctcc	480
tggagcagct	ggagaacatg	ccgccactga	aaggcgaga			519

&lt;210&gt; 19

&lt;211&gt; 460

&lt;212&gt; DNA

&lt;213&gt; Homo sapiens

&lt;400&gt; 19

tttcgtgcag	gggcccaggcc	tctctaggct	ctccggctga	gccggggttg	ggccccgggtt	60
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tagcggagag	gcgtgcggga	tcgggatgtc	ggggctgctc	acggaaccgg	agcagagagc	180
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tgccgtaata	aaagaagcag	tcaaagctgc	aggaatacag	atgaatcaaa	ttgttggtct	420
tggcatttca	acacagagag	caacttttat	tacgtggaac			460

&lt;210&gt; 20

&lt;211&gt; 731

&lt;212&gt; DNA

&lt;213&gt; Homo sapiens

&lt;400&gt; 20

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gtggccatct	cagatgcaga	ggactgcgtg	cagctgaacc	agtacaagct	gcagagttag	600

attggcaagg	gtgcctacgg	tgtggtgagg	ctggcctaca	acgaaagtga	agacagacac	660
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cctccccga	a					731

<210> 21  
 <211> 519  
 <212> DNA  
 <213> Homo sapiens

<400> 21						
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tgaaatagtc	accatggggg	aaaatgatcc	gcctgctgtt	gaagccccct	tctcattccg	180
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tgctgcacag	atcctgtcac	tgctgccatt	gaagtttttt	ccaatcatcg	tcattgggat	300
cattgcattg	atattagcac	tggccattgg	tctgggcata	cacttcgact	gctcagggaa	360
gtacagatgt	cgctcatcct	ttaagtgtat	cgagctgata	gctcgatgtg	acggagtctc	420
ggattgcaaa	gacggggagg	acgagtaccg	ctgtgtcccg	gtgggtgggc	agaatgccgc	480
gctccaggtg	ttcacagctg	cttcgcggaa	gacctgtg			519

<210> 22  
 <211> 544  
 <212> DNA  
 <213> Homo sapiens

<400> 22						
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ggtggatgtg	tttgtgaccc	gcaaggagta	ctttatcttc	ctggagctgt	gagtgtgggt	480
ctggggaccc	aaaattcccc	agcggccagg	gctttcacct	gtcccacccct	ctgcagctaa	540
ggag						544

<210> 23  
 <211> 749  
 <212> DNA  
 <213> Homo sapiens

<400> 23  
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 cggaatgggg ggtgtggctg ctccgccagg gtccccaggg tgggagagcg gctccgcggc 120  
 caccgatgcc cggacccctt ctgtcttctg ctagacatgc tcttcctctc gtttcatgca 180  
 ggctcttggg aaagctgggt ctgctgctgc ctgattcccg ccgacagacc ttgggaccgg 240  
 ggccaacact ggcagctgga gatggcggac acgagatccg tgcacgagac taggtttgag 300  
 gcggccgtga aggtgatcca gagtttgccg aagaatgggt cattccagcc aacaaatgaa 360  
 atgatgctta aattttatag cttctataag caggcaactg aaggaccctg taaactttca 420  
 aggcctggat tttgggatcc tattggaaga tataaatggg atgcttggag ttcactgggt 480  
 gatatgacca aagaggaagc catgattgca tatgttgaag aaatgaaaaa gattattgaa 540  
 actatgccaa tgactgagaa agttgaagaa ttgctgcgtg tcataggtcc attttatgaa 600  
 attgtcgagg acaaaaagag tggcaggagt tctgatataa cctcagatct tggtaatgtt 660  
 ctactttcta ctccaaacgc caaaaccgtt aatggtaaag ctgaaagcag tgacagtgga 720  
 gccgagtctg aggaagaaga ggcgtgtgt 749

<210> 24  
 <211> 556  
 <212> DNA  
 <213> Homo sapiens

<400> 24  
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 gctcggctct tcccgcctct ggtcgcggg gctgcgcgt cccagctca gtgacaaaaa 180  
 tgctgagttt cttccgtaga acactagggc gtccgtctat gcgtaaacat gcagagaagg 240  
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 ccatcatcac gtgtcgggtg tcccttctgg atgggtactga tgttagtgtg gacttgccaa 360  
 aaaaagccaa aggacaagag ttgtttgatc agattatgta ccacctggac ctgattgaaa 420  
 gcgactatth tggcttgaga tttatggatt cagcacaagt agcacattgg ttggatggta 480  
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 agttttattc ctccaga 556

<210> 25  
 <211> 422  
 <212> DNA  
 <213> Homo sapiens

<400> 25  
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 tacacagtcc cgggctgccc ttggttctgg tgcttctggc cctggggggc ggggtgggcc 180  
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 gagctgctgc agggggggcc gggggagcag ccctgggaga ggcacccctt gggcgagtgg 300  
 catttgctgc ggtccgaagc caccaccatg agccagcagg ggaacccggc aatggcacca 360  
 gtggggccat ctacttcgac caggtcctgg tgaacgaggg cgggtggctt gaccgggcct 420  
 ct 422

<210> 26  
 <211> 506  
 <212> DNA  
 <213> Homo sapiens

<400> 26  
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 atcaccagct tcattttctca atttcttggt taaagtgaga gaatctggct ccttgaaccc 180  
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 gttactgaac ataagaaaat tccaaatggg tcttatctca gacccagat caactgagat 360  
 tctcatacat ggctataaca gaaggagcaa aatgtgtaaa gggagattct agtatacaga 420  
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 aataatgact gaaaaataca atagga 506

<210> 27  
 <211> 850  
 <212> DNA  
 <213> Homo sapiens

<400> 27  
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 ccgggacggg cctggctgcc atcctgagga cactgcccac gtcccatgac gaggagcacg 180  
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 ggaacggacc 850

<210> 28  
 <211> 990  
 <212> DNA  
 <213> Homo sapiens

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<400> 28
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```

```

<210> 29
<211> 622
<212> DNA
<213> Homo sapiens

```

```

<400> 29
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ctcctgcagg gtgggcatgt ggggtgctgtg ttcaccacgc cccttcctcc accccacaaa 180
caccttggtg gctgtcctgg agcgcgacac actgggcata cgtgaggtgc ggctgttcaa 240
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cgaggagtgc gctgcaggta acagagctcg ggctcagggg ctggtttggg aggggagtgg 420
cacacaggtg ggcactctggg taccgaggat agtgccccg agttcactgc ggaaagcctg 480
gcagatgcct ggcatataca gataggaaga aacctggctt gtgaggacgc gtccacaggg 540
ccatctgtta gccccggccc ggctctgtcc ccacctgca cactgccaga cccgcctct 600
cgtgtctgtc cagctgtttt gg

```

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<210> 30
<211> 181
<212> DNA
<213> Homo sapiens

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<220>
<221> misc_feature
<222> (1)...(181)
<223> n = a,t,c or g

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<400> 30  
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 <212> DNA  
 <213> Homo sapiens

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 <212> DNA

&lt;213&gt; Homo sapiens

&lt;400&gt; 32

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aagagatgag	accatccagg	tgaaaggaaa	cggctaogtg	cagagtccta	gattcccgaa	420
cagctacccc	aggaaacctgc	tcctgacatg	gcggcttcac	tctcaggaga	atacacggat	480
acagctagt	tttgacaatc	agtttgatt	aac			513

&lt;210&gt; 33

&lt;211&gt; 712

&lt;212&gt; DNA

&lt;213&gt; Homo sapiens

&lt;400&gt; 33

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gatattcaag	ctgactatgg	cctgcaacaa	ggtcctcagc	aaagaatact	gcaaagcttc	360
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&lt;210&gt; 34

&lt;211&gt; 600

&lt;212&gt; DNA

&lt;213&gt; Homo sapiens

&lt;400&gt; 34

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 <211> 985  
 <212> DNA  
 <213> Homo sapiens

<400> 35

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<210> 36  
 <211> 464  
 <212> DNA  
 <213> Homo sapiens

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caatcagttt	gtgcctggcc	gtaacattcg	ctccactgtt	caatgcgcag	gccgatgagc	240
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 <211> 429  
 <212> DNA  
 <213> Homo sapiens

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 gaatccgtat atcgaagatg tggcacggcg agtggcgaaag gcgggggtata tcgccctggc 360  
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 agcgcccc 429

<210> 38  
 <211> 556  
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 <213> Homo sapiens

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 aacgcgaaag ttccgggtgca acgtgcgatg cagtggatgc caataagcca gaaagccggt 360  
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 tccggacgtg atgtttatcg ccgtatgggc tggagtggtg agccgacgac cagcgagctg 540  
 aagaattcct caagac 556

<210> 39  
 <211> 890  
 <212> DNA  
 <213> Homo sapiens

<400> 39  
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gtgctctaga	gtattttgtt	tatacaatta	gagacagaag	agaaaggaga	aagctcctgc	660
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 <211> 393  
 <212> DNA  
 <213> Homo sapiens

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 <211> 437  
 <212> DNA  
 <213> Homo sapiens

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cgaggaagcc	tcctgcc					437

<210> 42  
 <211> 392  
 <212> DNA  
 <213> Homo sapiens

<400> 42  
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 tggcaaaccg caaacagacc cgactctcga atgggttcttg tctcattgcc acattcataa 360  
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<210> 43  
 <211> 555  
 <212> DNA  
 <213> Homo sapiens

<400> 43  
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<210> 44  
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 <212> DNA  
 <213> Homo sapiens

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 cgcaagctgc ttgagcagga gatggtcaac ttccgttctg agggtaaaga ggtgcatatc 180  
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 gattgcgcgc ttgctcatct cctgttcgac gaccaaaaaa ggcgatacct ataacgaagc 360  
 ctgggtcaaa gataccaacg gttttgatat tctgatgggg caatttgccc acaatattga 420  
 gaacatctgg ggcttcaaag aggtggtgat cgctggctcct aaggactacg tgaaatacac 480  
 cgatcaatat cagaccgcga gccacatcaa cttcgatgac ggtacgatta ctatcgacc 540  
 catccccggg aca 553

<210> 45  
 <211> 310  
 <212> DNA  
 <213> Homo sapiens

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 taccctctcc 310

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 <211> 627  
 <212> DNA  
 <213> Homo sapiens

<400> 46  
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<210> 47  
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 <212> DNA  
 <213> Homo sapiens

<400> 47  
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<210> 48  
 <211> 864  
 <212> DNA  
 <213> Homo sapiens

<220>  
 <221> misc\_feature  
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 <223> n = a,t,c or g

<400> 48	
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ctggcccgtg	gcctgccacc
cagaggattc	tggtaatcgc
ggctctgggt	gctgggcttc
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gtagccgac	aggatctgg
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ctc	
gtcctggctat	gtcaccagag
tcaagtgtac	ctcccaacct
acctggctaa	tttttttatt
acttgaactc	ctgggttcaa
cactgcacct	ggccctgtct
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tgcaagggtg	gtcccccgtg
agggaccgt	aaggcacgag
cagtagctgc	cgtagagtg
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caccatttng	

<210> 49  
 <211> 1327  
 <212> DNA  
 <213> Homo sapiens

<400> 49	
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aaactctctg	actgactgga

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cactcattct	ggccactgtg	tgccagatgc	tggggattct	gtcctcttgg	gagctgacgt	180
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ggaagtgtgc	tggggaggcc	ctctctgagg	aggtgacatg	ccagctgaga	tctgaatggc	300
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ctgtatt						1327

<210> 50  
 <211> 436  
 <212> DNA  
 <213> Homo sapiens

<400> 50		
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ttcttcgcy	ccccattccc atcagacaat ctcccctaca ccctccagtc ccctttcccc 300	
tcacctctc	cagctactcc ctctgacct gctcttatcc tccaccacag acttaaatgg 360	
ggggccagat	gaccctctgc agcagacagg ccagctcttc gggggcctgg tgcgtgatat 420	
ccggcgccgc	tacccc	436

<210> 51  
 <211> 481  
 <212> DNA  
 <213> Homo sapiens

<400> 51	
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accccctgga	gccccaaaat gcagataaga tcaagatcaa gatcgacagac ctgggcaacg 180
cctgctgggt	ggtatgagca agtgtgggag agcagagtgg ggggccctgc tccaagggtg 240

gaggcacagg	gccgctcttg	gggagcccta	ccccagtcctg	cagtgcacgt	gaaccgtcgg	300
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cactaggaag	ggatcagcct	cagcctcaga	tcactggggc	tgccctctt	ggaggacctg	420
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g						481

<210> 52  
 <211> 435  
 <212> DNA  
 <213> Homo sapiens

<400> 52						
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gctgccccctg	gagtgggttg	cagagacttg	ggtgggtatat	gtgatctacc	ggaataactgt	240
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<210> 53  
 <211> 728  
 <212> DNA  
 <213> Homo sapiens

<400> 53						
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gtcttttcg						728

<210> 54  
 <211> 2228  
 <212> DNA

&lt;213&gt; Homo sapiens

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<400> 54
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gggtcaaacct ttttaatgat cagtgtaaaac ataaaacatc catgatctgt taacacacac 180
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cagccccctgc tgccatcata aagcacggga gggattgttt tgccttagc ggctctgtcc 480
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ggaattca
2228

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&lt;210&gt; 55

&lt;211&gt; 405

&lt;212&gt; DNA

&lt;213&gt; Homo sapiens

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<400> 55
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aaactagcca ggctgtgtga cacacatctg taatccagc tactcgaggc gctgaggcag 120
gagaatcact tgaaccagga ggcagagggt gcagttagcc gagatcatgc cactgcactc 180
cagcctgggc cacagagcaa gactccatct gacaactagc tgttccagcc cccagccact 240

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tgagtcacatc	cagctgaggg	cccacacacc	aagaagcaga	ggtgagtccta	atccacagag	300
ccctgggtcag	acatgatgac	ggtggcttca	cccggggggtc	tccgcacagc	agcggcctcg	360
ggtaagcaga	acctcgctcc	gggggtttaca	aatccttcct	cgtgc		405

<210> 56  
 <211> 1652  
 <212> DNA  
 <213> Homo sapiens

<400> 56						
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gctacgcgct	gccgagccgg	ctccccatgc	cagctacggc	ggcatcgtct	cgggtggagac	300
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cctgcggcgg	gaccttcaga	cacttttctg	gcgctcccg	gtcaccaccc	ccatcaatcc	1020
ctgggtacttc	aaacacagtg	atggcagctt	ctccaacaag	cagtggatct	tcttctgggt	1080
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<210> 57  
 <211> 1129  
 <212> DNA  
 <213> Homo sapiens

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taaagtgtta	gttccttata	attccatctc	tttcagcacc	caatacaggg	gtttacatag	360
aggaagtact	caatatttcc	tttctttttt	tctttttttt	ctggagatag	tctcgctctg	420
tcaccaggct	ggagtgcagt	ggcgtaatct	cggtcactg	caacctccac	ctcctgggtt	480
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<210> 58  
 <211> 475  
 <212> DNA  
 <213> Homo sapiens

<400> 58						
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cttcgagtg	ggcttcgtgg	tcccgagcgt	ggggtgctgt	gtgatgctgc	tttttgatt	180
cggagcctgc	gcaaacacac	cgagaaaaag	aagctcatcg	ctgccgtgg	gctgggaatc	240
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catcggcaga	aacctggctg	ctaaaggcaa	ccaaacgggc	gccatcagat	accaccggga	420
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<210> 59  
 <211> 711  
 <212> DNA  
 <213> Homo sapiens

<400> 59						
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tgtgtgatcg	acataagaga	cataaaacct	tgcgtctcgg	agcacttcct	agcatgcccc	600

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gagccctggg cctttcaagc accagtcaat atccaggcgg agcaggcagg tactgctatg 660
aacatcagcg ttccccaggt gcagctgac aaccagaga accaaattgt g 711

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<210> 60
<211> 344
<212> DNA
<213> Homo sapiens

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<400> 60
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cgcacgaagt gctgccatgg agatctgctt gaatgcgctg atgacagggc agaccttgct 180
gaggatatct gggaaaatca agattcaatc tccactatac tgattgaatg ctgtgaaaaa 240
cctctgttgg aaaaatccca ctgcattgcc gaagtggaaa atgatgagat gcctgctgac 300
ttgccttcat tagctgctga ttttgttgaa agtaaggatg tttg 344

```

```

<210> 61
<211> 594
<212> DNA
<213> Homo sapiens

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<400> 61
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gtgtcctgca gcagattctg agtgccaccc aagatgaaga gagggacaag cttgcatagt 180
aggcggggca agccagaggc cccaaaggga agtccccaaa tcaacaggaa gtctggtcag 240
gagatgacag ctgttatgca gtcaggccga cccaggctct catccacaac tgatgcacct 300
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ccaggagagg agggaaactgc ggagcggatc gaacggttgg aagtaagcag ccttgcccaa 420
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acaccagacc ctacgcgcac aaaggctgcc attgtccacc tgcagcagaa gatcctgaag 540
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<210> 62
<211> 1609
<212> DNA
<213> Homo sapiens

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<223> n = a,t,c or g

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 <213> Homo sapiens

<400> 63

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<210> 64  
 <211> 839

<212> DNA  
 <213> Homo sapiens  
  
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 <223> n = a,t,c or g

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 <212> DNA  
 <213> Homo sapiens

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 <211> 1888  
 <212> DNA  
 <213> Homo sapiens

<400> 66						
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 <213> Homo sapiens

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&lt;210&gt; 68

&lt;211&gt; 839

&lt;212&gt; DNA

&lt;213&gt; Homo sapiens

&lt;400&gt; 68

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 <211> 801  
 <212> DNA  
 <213> Homo sapiens  
  
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 <223> n = a,t,c or g

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<210> 71  
 <211> 540  
 <212> DNA



&lt;213&gt; Homo sapiens

&lt;400&gt; 71

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&lt;210&gt; 72

&lt;211&gt; 428

&lt;212&gt; DNA

&lt;213&gt; Homo sapiens

&lt;400&gt; 72

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ctatgacc						428

&lt;210&gt; 73

&lt;211&gt; 584

&lt;212&gt; DNA

&lt;213&gt; Homo sapiens

&lt;400&gt; 73

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tatcaatttt	gccaatgcag	tcagcgatgc	tcttgactcc	ttcaagagt	gcccggccga	420
cctggcagcc	atataccatg	agcgcatgga	cgtgggaaggc	caccactacg	ggcctgcac	480
tccgcagagg	aaagatgccc	tcaaggctgg	tagacactgt	cctgaagtac	atgaccaagt	540
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<210> 74  
 <211> 348  
 <212> DNA  
 <213> Homo sapiens

<400> 74  
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 ccggaacaag tggaccctga tgccgaagtc gatgcagccc catctaccac atcttcatgt 180  
 ggacattgag attcacacgc tggctcctga agggtgctca gtctccttgg tgattaaggt 240  
 cctgcttgaa ctgggtgccaa ctccatggca ggggaagttgc ttttggttgc ctggctgggt 300  
 ttcccagatc ccttctgggg caaggagcta tcagaccctg ctttcaag 348

<210> 75  
 <211> 365  
 <212> DNA  
 <213> Homo sapiens

<400> 75  
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 tgaatgccag agcccacccc acatgacagg gccccggtgt gaggagcacg tcttcagcca 180  
 gcatcagcca ggacatataa cctccatcct aatccctatg ctgtagctgc tgctgctggt 240  
 tctggtggcc ggagtgatat tctgccataa acggcgagtc caaggggcta agggcttcca 300  
 gcaccaacgg atgaccaacg gggccatgaa cgcgcagatt gcaaacccca cctacaagat 360  
 gtacc 365

<210> 76  
 <211> 700  
 <212> DNA  
 <213> Homo sapiens

<400> 76  
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 ccgttctgaa tgataaacag tatagcaaca actctgccac tgaaatcctg ttctctgacc 240  
 gatattggca cctgcaaaga gaaacaacca gtaacaggca gcagcagcat cagtattaat 300  
 cttccatgat gaaatcttta cagggtcaaga acaagtacac agctcttttc tcactccttc 360

acagtggacc	atgcaactag	ttgaggtgga	agacaatgga	ttgtctacaa	gccttttgaa	420
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gtttggaaag	agtcagaaat	cttcacatac	gtgagctgaa	aagaataaac	aatgaagata	540
attcacagtt	caaagatcac	ccaacattaa	atgaaagata	tttattactt	catctgcttg	600
gtagaggtgg	cttttagtgaa	gtgtataagg	taatgtatgg	tttattctgg	tttttttaca	660
ctaattgtagc	aaggatatag	gagtatgtgg	ttaagaagtg			700

<210> 77  
 <211> 426  
 <212> DNA  
 <213> Homo sapiens

<400> 77						
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cctttg						426

<210> 78  
 <211> 358  
 <212> DNA  
 <213> Homo sapiens

<400> 78						
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aagaccggtt	tgagctactt	cttacaaaat	tcctctactc	ctgggaagcc	caaaaccggc	180
aaaaaaagca	aacagcaagc	tttcatcaag	taagttgaga	atcctgagct	tgcaaatatc	240
aatagttagc	tgctgaactg	aaaaggggaa	ctctgatgag	cgtaagctaa	catacagaac	300
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<210> 79  
 <211> 322  
 <212> DNA  
 <213> Homo sapiens

<400> 79  
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 aagagcagtt ttccaagcaa agacgccaga cactccagtg tgcaccggta gttcacccaa 180  
 ctgcattggg gaccgccctc tcatactcca gccaggccgt gacgtgaccg acctccgact 240  
 tctgcgcaaa ggcagcgcaa gccgttggga tccctcgctc cccctcgctc aacagtcggg 300  
 ccattacacc ttccatactg cg 322

<210> 80  
 <211> 310  
 <212> DNA  
 <213> Homo sapiens

<400> 80  
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 gatgatcaac aagaattaaa acgcgtaaca tagtatagtc aaaaagaata cacgaaaaag 120  
 aaactccata aaaaatgcaa tatcatacag gcagatatca agccagacaa tatcctggat 180  
 aatgaatcca taactattct aaagcttagc gattttgggt cggcttcaca tgttgcggtat 240  
 aatgacataa caccttcctc ttctcagacc acatccgctg catcatcgcc cccgcggtacg 300  
 ctacgccgcg 310

<210> 81  
 <211> 134  
 <212> DNA  
 <213> Homo sapiens

<400> 81  
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 gactgctatt gcataatacc aacgtgcatt ggacgagaac gatgctatgg aacctgcata 120  
 ggcgacacgg tcgg 134

<210> 82  
 <211> 358  
 <212> DNA  
 <213> Homo sapiens

<400> 82  
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 tactctcacc acttttaata ctttttagtat tacagttgat cagattacct ttacttgata 120  
 tgaattatct ctaagttcat tccctgtgt tgtagcttat ttcaacaatt ccaactagcc 180

gtttaaaatt	cctcaaagaa	actgggtcatg	gaacaccaat	ggaagaaata	cctgaggagg	240
aattatcaga	ggatgttgaa	cagattgatc	acgtgatag	ggagttgcgg	cgtggccaaa	300
acttgagggtg	caaaggaatt	catagattgc	ctactcatat	acaagtaggg	caaaatcg	358

<210> 83  
 <211> 723  
 <212> DNA  
 <213> Homo sapiens

<400> 83						
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atcgtgtatt	ttacacaggt	atccaaacat	aaaaatactt	tagaattgct	tactgtatgg	120
acaggttata	tggaatggag	tttgtagtat	ccacattaac	aaagcaagtt	tatatggact	180
ggttatgata	ttagggatat	gaattagaaa	tggatgttgt	tgcactcatt	taaaatatatt	240
tgcctctcac	tttatcccca	gttatagtgt	ccttttgaat	ttttctcaca	cagtgtctact	300
atatttcatg	aactggtata	taaacaaacc	aaaattatatt	cttcaaatca	agaacttato	360
tacgaagggc	gacgcttagt	cttagaacct	ggaaggctgg	cacaacattt	ccctaaaact	420
actgaggaaa	accctatat	tgtagtaagc	cgggaacctc	tgaataccat	aggattaata	480
tatgaaaaaa	tttccctccc	taaagtacat	ccacgttatg	atthagacgg	ggatgctagc	540
atggctaagg	caataacagg	ggttgtgtgt	tatgcctgca	gaattgccag	taccttactg	600
ctttatcagg	aattaatgcg	aaaggggata	cgatggctga	ttgaattaat	taaagatgat	660
tacaatgaaa	ctgttcacaa	aaagacagaa	gttgtgatca	cattgggatt	tctggtatcc	720
aga						723

<210> 84  
 <211> 407  
 <212> DNA  
 <213> Homo sapiens

<400> 84						
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tacaacctca	tggatgggga	cctgggactg	atctcaggct	ggggccgaac	agagaagaga	120
gatcgtgctg	atcgccctcaa	ggcggggagg	tcacccgcag	ctgggtaaag	aaaatgggaa	180
cccgaggagag	gggaccctac	gtgggaagaa	tcagaggaag	atgtacataa	gagtaagtgg	240
acaagatgtg	tggatgagaa	gggcgcgtag	tgctaaacag	acaataagag	accgctcagg	300
tgtgggggtga	cctaattgggg	agacgtggaa	tatgtttggg	ggcacggagg	aaagtctaata	360
ggatatcgtg	tttaggagga	cgatggagtc	ttacgtgctc	gttgatg		407

<210> 85  
 <211> 342  
 <212> DNA  
 <213> Homo sapiens

<400> 85  
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 atagacaagc tggagctgct ggctcccga tgaatttcag acctgggggtt ctcagctcca 180  
 ggcaacttgg actcccagga cctcctgacg gtcctgacta tactgtttac taccggttcc 240  
 atcgacttgc catggtgact gctgcctcac gattggagcg tgaacacctt acgcatttat 300  
 gacactaggg atacaatgga gaggtataga gcaaccctag cg 342

<210> 86  
 <211> 420  
 <212> DNA  
 <213> Homo sapiens

<400> 86  
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 gccctggcca gtaggagcca caaagcgaga ttagcctcac tgcatttcag gtacaggccg 180  
 gcgccagccg tgccctacca ggtccaccgg ctccgagcag cagcaagccc ggtcggaaag 240  
 cgaaagtggc ctgcctatgt ccagaccggc cagctcccc gcctacctga ccccgccccg 300  
 cagccgcacc tgggtccgag tcatcgccgc ggccgccacg gccccgcaca ggaaggcggc 360  
 agcaaaagac gcacgctcga cgcgctgcag ccaggacagc gccatggcgc ccctcgtgcc 420

<210> 87  
 <211> 392  
 <212> DNA  
 <213> Homo sapiens

<400> 87  
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 cttttctgac accctcaaag gtcagaaggt taaaggggca gaaggcattc ggaaagctcc 120  
 cctcccacag tgacacctct ctgacttctg acctagggtt ccaccaccgc ttcaatccca 180  
 atgcctccag ctccctcaag ccagtgagg ccaagtttgc cattcagtat ggaactgggc 240  
 gggtagatgg aatcctgagt gaggacaagc tgactgtgag tggcctttga ctccaggaag 300  
 cctcgagcct gggagaacct tgttgtctaa gatcatctgg cttagggagg ggcttgagggt 360  
 gcaggggctt cctgagccga tggatggggc tt 392

<210> 88  
 <211> 332  
 <212> DNA  
 <213> Homo sapiens

<400> 88  
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 ggccagtatt gatgctatct tttcccttac ctatcagact ctttcaaaga gaaaagaggg 180  
 agcagttgga attttatgtt tgttgttcta ttttgtctat tatgaattgt gacaaaacca 240  
 ttataaaaaga tgacaagtgt gtgtgtttct ttttttcttt ttaaactgta gggaacatag 300  
 tcattagtga tctcaaatac cgaaagacat tt 332

<210> 89  
 <211> 535  
 <212> DNA  
 <213> Homo sapiens

<400> 89  
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 gatttcagga gacaagtatt atctttaaat ctaaatgggt gcaattcatt aatgaaaaaa 120  
 ttacagcatc tttttgcctt tctggcccat acacagaggg aagcatacgc acctcggata 180  
 ttctttgagg cttccagacc tccatgggtt actccagat cacagcaaga ctgttctgaa 240  
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<210> 90  
 <211> 432  
 <212> DNA  
 <213> Homo sapiens

<400> 90  
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 agcagcgtaa tgggctgcat tactagttag ttccttatgt gagggtgga gcatatgctg 120  
 gatgacttat ctagaataat gtagaagaga attaaacatt gaatgggagc ttaaattagt 180  
 taattttctga gggtcccttc cattcttaga attctttgat ttttatattg aattgagaga 240  
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 tgcttttcat ctttaagata ctaaaccttt tcaactcatg caattttttt tagctagcct 360  
 ctaagcttgg aaagcagtgg accccattaa taatcctggc caactctctt agtggaacta 420  
 atatgggaga ag 432

<210> 91

<211> 780  
 <212> DNA  
 <213> Homo sapiens

<220>  
 <221> misc\_feature  
 <222> (1)...(780)  
 <223> n = a,t,c or g

<400> 91  
 ccattgcatag gattaaactg aatgatcgaa tgacatttcc cgaggaacta gatatgagta 60  
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 cagaaaatga aggtagtgtt cacagtgatc agatgagcaa cgatttctcc aatgatgatg 180  
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 aagtaatgat ggaaaantaa attgaggttc ataaggataa gacattaaag gaagcagtag 720  
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<210> 92  
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 <212> DNA  
 <213> Homo sapiens

<400> 92  
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 gtgaggcccc tgtgcaggga ggagctgcct gttcactggg atcagccagg gcgcggggcc 720  
 ccacttttga gcacagagca gagacagacg caggcggggg caaaggcaga ggatgtagcc 780  
 ccattggggg ggggtggagg aaggacatgt accctttcat gccacacac ccctcattaa 840  
 agcagagtca aggcattctca aaaaaaa 867

<210> 93  
 <211> 690



<212> DNA  
<213> Homo sapiens

<400> 93  
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atatctcttt ctgtgggaga tcactttggg 690

<210> 94  
<211> 948  
<212> DNA  
<213> Homo sapiens

<400> 94  
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gcaggggctg gatctcggtt cactgcaacc tccgtctccc ggactaaagc aattatcctt 120  
cctcacgctt ccgagtagct ggaattacag gtgtcaagct agggatgcgg tccattccca 180  
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acccttacct gattgccatg tcttcaattt acttgccggg caaagtggaa gagcagcacc 300  
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gaggactttg actacaatac aggcattgaca tcaatgaaag gaaagtcatg aaatcgatga 840  
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ggctgaaatc tattttgtgt aataaaaggt gatacaagtc aaaaaaaa 948

<210> 95  
<211> 541  
<212> DNA  
<213> Homo sapiens

<400> 95  
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 ggaagcaggg acgcctgtaca tggctgggct ttccggcctcc tcttcatcaa caaggagtcg 180  
 gtggctcatgg cctatctctt caccaccttc aacgccttcc aggggggtctt catcttcgtc 240  
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 gggagcacga gctcaggggtt agggaggggt taaccaagg tgaagagggt tctgttgaca 480  
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 t 541

<210> 96  
 <211> 603  
 <212> DNA  
 <213> Homo sapiens

<400> 96  
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 ttgaatggac actgaaggca ggggtgagaaa aaggctagcc ctcgaaagtga aataagggtc 120  
 gggagggcca agaattgatga tagacggtga gggactgagg gatcagctga tgagttaagc 180  
 ctcaacacct gtccctagggc tttgcagatg gccctcaaac gtgtttacac cctcctgagc 240  
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 gcc 603

<210> 97  
 <211> 1385  
 <212> DNA  
 <213> Homo sapiens

<400> 97  
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 ctcgggaaac aaacaggatc ttctctgccc tgctccagtc gagttggcct gacctgcttg 180  
 gatcagtgac catctgtctg cagacagggg agagcagctt ccagcctggg tcagaagggg 240  
 tgggcgagcc cctcggtccc tcaccctcca ggtgctgtg agagtgtcaa gtgtgtaagg 300  
 gcccaaactc aggttcagtg cagaaccagg tcagcaggta tgcccggccc tacgttaagg 360  
 gggccctcta aacctcttgc ctggcctcac ctggccagct caccctttt ggggtgtaggg 420  
 gaaaagaatg cctgacctg ggaaggctcc ctggtagaat acaccacact tttcaggttg 480  
 ttgcaacaca ggtcctgagt tgacctctgg ttacagccaag gaccaagaa ggtgtgtaag 540  
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ctgccctgcc	cctggccaga	gggtactgcc	gacggcactt	tgactctga	tgacctcaaa	900
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tcattccac	atcttgccaa	gacagccttt	gtccagctgt	ccacattgag	tcagactgct	1260
ccgggggaga	gagccccggc	ccccagcaca	taaagaactg	cagccttggt	actgcagagt	1320
ctgggttgta	gagaactctt	tgtaagcaat	aaagtttggg	gtgatgacaa	atgttaaaaa	1380
aaaaa						1385

<210> 98  
 <211> 2191  
 <212> DNA  
 <213> Homo sapiens

<400> 98						
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tttgtcatta	tgagatgtcg	tctctcggtg	cctcctttgt	gcaaattaaa	tttgatgact	180
tgacgttttt	tgaaaactgc	ggtggaggaa	gtttttgggag	tgtttatcga	gocaaatgga	240
tatcacagga	caaggagggtg	gctgtaaaga	agctoctcaa	aatagagaaa	gaggcagaaa	300
tactcagtgt	cctcagtcac	agaaacatca	tccagtttta	tggagtaatt	cttgaacctc	360
ccaactatgg	cattgtcaca	gaatatgctt	ctctgggata	actctatgat	tacattaaac	420
gtaacagaag	tgaggagatg	gatatggatc	acattatgac	ctgggccact	gatgtagcca	480
aaggaatgca	ttattttacat	atggaggctc	ctgtcaagggt	gattcacaga	gacctcaagt	540
caagaaacgt	tgttatagct	gctgatggag	tattgaagat	ctgtgacttt	ggtgacctct	600
ggttccataa	ccatacaaca	cacatgtcct	tgggttggaa	tttcccatgg	atggctccag	660
aagttatcca	gagttctcct	gtgtcagaaa	cttgtgacac	atattcctat	ggtgtgggtc	720
tctgggagat	gctaacaagg	gaggtccccct	ttaaagggtt	ggaaggatta	caagtagctt	780
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ctgaactggt	acatcagtg	tgggaagctg	atgccaagaa	acggccatca	ttcaagcaaa	900
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tcctacacaa	caaggcggag	tggagggtcg	aaattgaggc	aactcttgag	aggctaaaga	1020
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tgatcatgtc	gatcacagca	acaagtaacg	gggagggcca	tggcatgaac	ccaagtctgc	1260
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gtgacgatga	tgatgatgat	gacggtgagg	aggagtataa	tgacatggat	aatagtgaat	1500
gaaagcagaa	agcaaaagtaa	taaaatcaca	aatgttttga	aaacacaaaa	gtaacttggt	1560
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aatcacattt	acatgaccgt	aatttcttat	caattctact	tttatTTTTg	cttacagaaa	1680
aacgggggga	gaattaagcc	aaagaagtat	atthtatgaat	cagcaaatgt	ggtgcctgat	1740
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tttcttttaa	tgaatacttt	ttagtttgta	tttgacttta	tttcttttat	tcaaatcatt	1860
tttaaaaact	tacatttttg	acaaacactc	ttaactccta	attgttcttt	gacacgtagt	1920
aattctgtga	catacttttt	ttttcttata	gcaatacact	gtaatatcag	aaatggttgg	1980
cctgagcaac	ctagtaagac	ctcgtctcta	ctaataatta	aaaaactagc	tggcatggta	2040
gcacacacct	gtagtccag	atacttggga	ggccaaggca	ggaggattgc	ttgagaccta	2100
gcaatcagtc	agggtctcag	tgagccatga	tggcaccact	gcactctagc	ctgggcaaga	2160

gaacaagatc ctgtctcaaa aaacagggaa a

2191

<210> 99  
 <211> 335  
 <212> DNA  
 <213> Homo sapiens  
 .  
 <220>  
 <221> misc\_feature  
 <222> (1)...(335)  
 <223> n = a,t,c or g

<400> 99  
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 ctatatactc cttgttgcca ctgctgagtg actagactgg cccagagatc cgcggtgcac 120  
 atgctggccg ctccctccctc agaaaaaggc aatggcctaa atactgttta aatgacctga 180  
 ctcgatgctg tgggaaactg gctgctctgc tgcatgccgt gtgactgtca gtccaaccgt 240  
 tacatttgcc acgttctcca cacgggggat agacgcaatg cgcccaggtc ccagttttct 300  
 ttggaggcag cagctctcgc agggctgaat gttgn 335

<210> 100  
 <211> 348  
 <212> DNA  
 <213> Homo sapiens

<400> 100  
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 tgtactagaa aaaattgtaa tcctcttact ataactgtcc atgaccctaa ttcaactcag 120  
 tagtattatg gcatgtcatg ggaattaaga ttttatatcc caggatttga tgttgggact 180  
 atgttcacca tccaaaaaat cctggctcga tggagcccac ccaagccaat cgggccttta 240  
 actgatctag gtgaccctat gttccagaaa ccccctaaca aagttgattt aactgttcct 300  
 ccaccattct tagtcataaa agatacactc caaaagttcg agaaaatc 348

<210> 101  
 <211> 416  
 <212> DNA  
 <213> Homo sapiens

<400> 101  
 agcctcaata atgtaacact gcccgaagcg aaaacagaaa aagatttcat ccaactctgc 60

acccctgggg	taattaagca	agagaaactg	ggcacagttt	actgtcaggc	aagctctcct	120
ggagcaaata	tgattggtaa	taaaatgtct	gccattttctg	ttcacgggtgt	gagtacctct	180
ggaggacaga	tgtaccacta	tgacatgaat	acagcatccc	tttctcaaca	gtaggatcag	240
aagcctatct	ttaatgtcat	cccaccaatt	cccgttggtt	ctgaaaattg	gaatagggtgt	300
caaggatctg	gagatgacaa	cttgacttcc	ttggggactc	tgaatttccc	tggtcgaacg	360
gtttcttttt	cttttgagat	ggagtctcgc	tctgtcgcgc	aggctggagt	gcagtgt	416

<210> 102  
 <211> 352  
 <212> DNA  
 <213> Homo sapiens

<400> 102						
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actaattctg	aatcaccaa	tatgtatctg	tgtttgggaa	atagaggcat	acacaggaat	120
gcagatgccc	acacactcac	attcacactc	acactcactc	tcacactcac	tctcacactc	180
actctcactc	gcactctcac	actacaccga	gatgtctaca	cactcagcct	ccccatgccc	240
aggcccctgc	tctttgttaa	tcataagaag	accgtggaca	accacctgg	aaactatgtg	300
cccacagacc	cagactgaag	gtgataaaa	aggggtggctg	gcttgggggc	tg	352

<210> 103  
 <211> 702  
 <212> DNA  
 <213> Homo sapiens

<400> 103						
aaagcagtg	cctggaaaag	cctgctgagg	gtgaagggga	accatccagt	gtcctggggtt	60
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tgggtggtatg	agaagcagag	gctaattgtc	taccccctgc	ctccaagtag	aattactcct	180
tgtctgtgta	cctgggtgagg	cagttgactg	caggaaccct	tctacaaaaa	ctcagagcaa	240
agggtatccg	gaacccagac	cactcgcggg	cactgagtga	gtaacatctt	tctctcttct	300
cccacctgat	ctggattcaa	gtcttctctg	ccctccagcc	ttcataatta	aaccataacc	360
tcttttttga	caacttactc	cccttctcac	atgaacccca	accctcccc	tctacccttg	420
accagtcttc	cagtctttat	agttgaagtt	ggaccactcc	caggcaccct	tgaatttcca	480
atcatgtatc	tgctttgcac	ctcacagtcc	ctaactccag	ccctgctaga	atatgggctc	540
tccggactgg	aaagaatctt	aggggtcctc	taatctaacc	ctcacatgat	gcttcaactc	600
ctccagatca	tctctaaccat	agccagagt	tcacgctatg	tttaagcatc	ttcagggatg	660
ggaaaaatccc	ccacacccat	gtattgcggc	cgctctagag	ga		702

<210> 104  
 <211> 689  
 <212> DNA  
 <213> Homo sapiens

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<400> 104
ggcaacatac attgtggact ttggcttcag tacaacattc agagaggggc agatgctgac 60
agctttttgt ggcattgtacc cctacgtggc cccagaacgc tccctgggcc aggcattgcca 120
gtgacccgcc agggacatac aaagcctcag tgtcatactg tatttcagga atacagtagg 180
tagaaggggc agggactttgc ccttttactc aggggaagcct ccaaacttca agaaaaaatt 240
ctcacaggaa gatattcatgc cccaccactt cttgcccttc aacttgactc attaaaaaat 300
tactaatgct gaacgccagg aagtgtcctt cactgtaact gatgaaaaat ccatgggtga 360
aaagtagcca gaagatgcca ctgataccat acgaagagcc actcctggac caccaccaaac 420
aatccagctc atgggtggcca tgggatttca ggccaagaac atctctgtgg caatcataga 480
aagaaaattc aactatccca tggccacctt cctcatttta gagcacacaa aacaagagag 540
gaagtgtccc accatcagag aactgtccct tcctcccggt gttccacact ctcttcccc 600
atccactgaa ctttccacct tccctctctc actgatgcgg gctcataggg agccagcttt 660
taacgttcag cctcccgagg aaagccagg 689

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<210> 105
<211> 776
<212> DNA
<213> Homo sapiens

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<400> 105
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agtcttgctg caccacgcca aagctggcac catcattgcc cgccaggag accaggacgt 120
gagcctgcac ttctgtctct ggggtgcct gcacgtgtac cagcgcattga tcgacaaggc 180
ggaggacgtg tgctgttctg tagcgagcc cggggaactg gtggggcagc tggcggtgct 240
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gcagggcgac cgctccgact gcacttacat cgtgctcaat gggcggtgct gtagcgtgat 600
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cgtggtgagc gcgaccccc aacttgacc tctggccttt tccaggccag tccctcgga 720
actcacacgc atcatcccg gtaatccagg gagtgtgtaa gtttttcccg gggctc 776

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<210> 106
<211> 707
<212> DNA
<213> Homo sapiens

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<400> 106
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acacagttgc ttccactcca ggaaccagcg agactacagc ttcagctgag ggaagacgaa 120
cccaggagc aaccaggcca gcagctccag ggacaggcag ctgggcagag ggttctgtca 180
aagcacctgc tccgattcca gagagtccac cttcaaaagag cagaagcatg tccaatacaa 240

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cagaaggtgt	ttgggagggc	accagaagct	cggtgacaaa	cagggctaga	gccagcaagg	300
acaggagggg	gatgacaact	accaaggctg	ataggccaag	ggaggacata	gaggggggtca	350
ggatagctct	tgatgcagcc	aaaaaggtcc	taggaaccat	tggggcacca	gctctggtct	420
cagaaacttt	ggcctgggaa	atcctcccac	aagcaacgcc	agtttctaag	caacaatctc	480
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cagatgtgtg	gatcttggga	actccagctg	cagatgtgtg	gaccagcatg	gaggcagcat	600
ctggggaagg	aagcgtgca	ggggacctag	atgctgccac	tggagacaga	gggtccccaag	660
caacactgag	ccagaccccc	gcagtatgac	cctgggggacc	ccctggg		707

<210> 107  
 <211> 485  
 <212> DNA  
 <213> Homo sapiens

<220>  
 <221> misc\_feature  
 <222> (1)...(485)  
 <223> n = a,t,c or g

<400>	107	
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acattggaaa	caccagtttt	ggaaaatcag
ccagtagccc	tgtgagtaaa	cacaccgatg
gaagcaaacc	aggtacacct	ggaacaccag
ctggaattgc	atgacccacc	ctggaccaaa
atttcctgt	aaatcctcac	cagaacccat
aatttttagc	agctctgnnn	nnnnnnnnnn
actcg		

<210> 108  
 <211> 565  
 <212> DNA  
 <213> Homo sapiens

<400>	108	
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tcttgatctt	ccatctttcc	agggcagtga
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cttctgagct	cctgtctgcc	gcctcctctc
cctccttctc	aatctccagc	agcctctcgt
tcgagtctgc	gcgggcctc	ctgccgtggt
ggaccagat	gtcgtggctg	ctcacgtctc
gccgcctccc	caccgaggag	ccagcgtcgc
acctccgta	cccttctgct	aaaaacctct
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<210> 109  
 <211> 986  
 <212> DNA  
 <213> Homo sapiens

<400> 109  
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 tgggtggcgtg gtcgacagtg gtgtgtatgc ggtgcctccc ccagctgaac gtgaagcccc 180  
 ggcagagggc aagcgccgtg cggcctccag caccggcagc acacgcagca gccagtctgc 240  
 gtcctccttg gaggtggcag ggccgggccg ggaaacctg gagctggaag ttgctgtgga 300  
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 gcaggacctg caggctgctg tggccgccgt ccagagtgcc gtccacgagc tgttgaggtt 480  
 tgcccgacg cgggtgggca atgctgcca cacatctgac cgtgcctgc atgccaagct 540  
 tagccggcag ctgcagaaga tggaggacgt gcaccagacg ctggtggcac atggtcaggc 600  
 cctcgacgct ggccggggag gctctggagc cacccttgag gacctggacc ggtggtggc 660  
 ctgctcgcg gctgtgcccg aggacgcca cagctggcc tccttcctgc acggcaatgc 720  
 ctactgctc ttcagacgga ccaaggccac tgccccggg cctgagggg gtggcaccct 780  
 gcacccaac cccactgaca agaccagcag catocagtca cgacctgc cctcaccctc 840  
 taagtacc tccaggact cgccagatgg gcagtacgag aacagcgagg ggggctggat 900  
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 ggagcttctg ggaaaaagg cagcat 986

<210> 110  
 <211> 414  
 <212> DNA  
 <213> Homo sapiens

<400> 110  
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 aggtaaagcat gggaggaagg aagatggcga cagatgaaga aaatgtctat ggtttagaag 120  
 agaacgctca gtcccggcag gagtccacgc ggaggctcat ccttgttggg agaacagggg 180  
 ccgggaagag cgccactggg aacagcatcc tgggcccagag acggttcttc tccaggctgg 240  
 gggccacgtc tgtgaccagg gctgcacca cgggcagccg cagggtgggac aagtgccacg 300  
 tggaagtcgt ggacactccg gacattttca gctcccaagt gtccaagaca gatcctggct 360  
 gtgaggagag aggtcactgc tacctgctct cggcccccg accccacgcg ctgg 414

<210> 111  
 <211> 419  
 <212> DNA  
 <213> Homo sapiens

<220>  
 <221> misc\_feature



&lt;222&gt; (1)...(419)

&lt;223&gt; n = a,t,c or g

&lt;400&gt; 111

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tgagggtggc	acaggggctg	cggccagccg	ggcgctgggg	cagtgcgggc	agctccagaa	120
gctcatcgtc	atcttcattg	gcagcctgtg	cgggctgtgc	accaagtgcg	ctgtgtccaa	180
cgacctcacc	cagcaggaga	tacagacccc	ggagatacaa	cagagaaatg	cataatgtcc	240
agtcaattta	ttaaagtccc	aaagtnnnnn	nnnnnnnnnn	nnnnnnnnnn	nnnnnnnnnn	300
nnnnnnnnnn	nnnnnnnnnn	nnnnnnnnnn	nnnatttcaa	tatgattaaa	gcaggagtga	360
ggacacagcg	aaagtgcgac	aaggaaaaga	gaacaaaata	aaacaggaga	gacagaata	419

&lt;210&gt; 112

&lt;211&gt; 1191

&lt;212&gt; DNA

&lt;213&gt; Homo sapiens

&lt;400&gt; 112

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ccgtcccccg	actccgtccc	tacccccagt	cttcggcccg	ctctggcccc	tggggagggg	180
gctgcacggt	ggaaggaggc	tggctatggg	cccggctgcc	cgctgcatgt	acctcctcct	240
ccacccatcg	cctcttgccct	gggggtaact	ttgcctgggg	ctcattcttt	ggttaagctg	300
aagctgccgt	gggtggccaa	accgcagatt	ctttgcaaata	tctgagctgg	cagagctcgc	360
agccgggagc	cggccgggga	agaggagact	tgcgcgcgcg	aagccgcctg	cctccaccct	420
gctctccatc	tcccgctcta	gaagggtctg	gaagctcgcg	gccgggggtc	cacctggaag	480
ctgcttgcat	ggctgaaccc	agcttaggtc	cctgacgggg	ctgctgggtg	aattctcccc	540
cttcgaagct	ggggagggtt	aggaggggga	aggcttctgt	gaagctctca	aaccactaat	600
agagccccct	ccccaacagt	gacggcgcag	atgctccccc	ttttcttagt	tgacaccacc	660
aggcagcttc	ctggccggtg	gtaggttcct	gcagctggct	gaggggaacag	ggaccggcag	720
gggactttgt	taggggaggg	ttgggatggg	cagtgggccc	ctgaaagtta	atatattgga	780
acctagctcg	agtgtcgttc	ttccaattc	cgaagtaga	aagagtaaaa	ataggggtga	840
ttgggggtgg	gttagtagaa	tgcctctctc	agggcgctcc	ccctccccc	accgttttag	900
agagctaggc	ctcagccagt	cttgccactc	ccatctcagt	gcttctctgaa	gaggctgttt	960
tgagtgttga	tgaaaagcaa	tgcaattatg	ccaaacagta	ttgagcagaa	taatttattt	1020
cttttttttc	ttttgcttta	aatcatgaat	cccgccaggt	acggtggctc	acgcctgtca	1080
tcccagcact	ttgggaggcc	aaggcgggcg	gattacttaa	tacttaaggt	caggagtctg	1140
agaccagcct	ggccgatatg	gtgaaacctc	gtctctacca	aaaaaaaaaa	a	1191

&lt;210&gt; 113

&lt;211&gt; 1240

&lt;212&gt; DNA

&lt;213&gt; Homo sapiens

&lt;220&gt;

&lt;221&gt; misc\_feature

&lt;222&gt; (1)...(1240)

&lt;223&gt; n = a,t,c or g

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<211> 810  
<212> DNA  
<213> Homo sapiens

<400> 114  
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<210> 115  
<211> 320  
<212> DNA

&lt;213&gt; Homo sapiens

&lt;400&gt; 115

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cctgcagctg	tgtcctgggc	ttcattgcct	gctccatctt	cttgacagatg	agcctgaagc	180
caaaggtcat	gctgctgaca	gtggccctgg	tggcctgtct	cgtgctcttc	aacctctccc	240
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ccaacaggta	gggccccgcc					320

&lt;210&gt; 116

&lt;211&gt; 456

&lt;212&gt; DNA

&lt;213&gt; Homo sapiens

&lt;400&gt; 116

ggcaaggcag	gcggcgcggc	cggcctcttc	gccaagcagg	tgcagaagaa	gttttagcagg	60
gcccaggaga	agtagacaag	gcggtttggg	aagacatgtc	agccagaaga	aagagcgagg	120
gaagaaagac	aagaaggacc	tgagatagag	tttgggtttt	cctttttttc	tctctctctt	180
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&lt;210&gt; 117

&lt;211&gt; 2398

&lt;212&gt; DNA

&lt;213&gt; Homo sapiens

&lt;400&gt; 117

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caattccatg	cttatttccta	gcatgtcagt	tacaatggaa	acaagcatga	ttatgagcaa	600
catccagcga	atcattcagg	aaaatgaaag	attgaagcaa	gagatccttg	aaaagagcaa	660
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<210> 118  
 <211> 800  
 <212> DNA  
 <213> Homo sapiens

<400> 118						
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aacggcgcg	agatgaatct	ggtttacgac	cgcgacacca	tggcacggct	gggaatcgac	300
gtacaagccg	ccaacagtct	gttaaataac	gccttcggtc	agcggcaaat	ctcgaccatt	360
taccagccga	tgaaccagta	taaagtgggtg	atggaagtgg	atccgcgcta	taccaggagc	420
atcagtgcgc	tggaaaaaat	gttcgttatc	aataacgaag	gcaaagcgat	cccgtgtca	480
tatttcgcta	aatggcaacc	ggcgaatgcc	ccactatcgg	tgaatcatca	gggattatcg	540
gcggccttga	ccatttcgtt	taacctgccg	accggaaaat	cgctctcgga	cgccagtgcg	600
gcgatcgatc	gcgcaatgag	ccagcttggt	gtgccttcga	cggtagcgcg	cagttttgcc	660
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<210> 119  
 <211> 427  
 <212> DNA

&lt;213&gt; Homo sapiens

&lt;400&gt; 119

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aaaagagtca	cggcagagaa	gaaatccgtc	ttcatattgt	ttgcgatgtc	cctgatgaac	240
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cgtaatc						427

&lt;210&gt; 120

&lt;211&gt; 378

&lt;212&gt; DNA

&lt;213&gt; Homo sapiens

&lt;400&gt; 120

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caaactgac	attcagggcg	aaccggatat	gcogattgtc	agagtcggtg	cgcgcttgct	180
gtataactat	ctggttaaag	gcggcgttca	ggtttttgag	taccgcgcgc	gcccgcctcca	240
cggcaaagtg	gcattgatgg	acgatcactg	ggcgacagta	gggtccagta	atctccatcc	300
ggtcagttag	tcgggggaatc	tccaagcaaa	tgtcatcctc	cacgttctac	gggtaccgac	360
attgaatccg	taatcatg					378

&lt;210&gt; 121

&lt;211&gt; 508

&lt;212&gt; DNA

&lt;213&gt; Homo sapiens

&lt;400&gt; 121

ctgccgcctg	gtgaagttha	cgccccatcg	aagccctggc	aaaagaagtc	cgtgaactga	60
aataacatac	tcgttaattg	ctcaatccag	ccacaacgcg	agaactgacc	agtctgggac	120
gaaacctgaa	cogattgtta	aaaagtgaac	gcgaacgtta	cgacaaatac	cgtacgacgc	180
tcaccgacct	gacccatagt	ctgaaaaacgc	cactggcggt	gctgcaaagt	acgctgcgtt	240
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gccgcatttc	acagcaaatt	ggctactacc	tgcctcgtgc	cagtatgcgc	ggcgggacat	360
tgtcagccg	cgagctgcat	ccggtcgccc	cactgctgga	caatctcacc	tcagcgctga	420
tcaaaggcaa	gccgcgtaaa	gggggcaacg	tcactgtttt	tccattcaca	gcgatgtaca	480
gggacggaca	ttgaatccgt	gatcagtg				508

<210> 122  
 <211> 724  
 <212> DNA  
 <213> Homo sapiens

<400> 122  
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 ggtgactgtc attggggcta tcatcatcct gctggtagag gttccagaca tcttcagaat 480  
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 ggtggtaccc atgtcctttg cactcgtgct gggctggtgc aacgtcatgt acttcgcccg 660  
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 gatg 724

<210> 123  
 <211> 435  
 <212> DNA  
 <213> Homo sapiens

<400> 123  
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 cagggtgtca tcgacaagga tgcgctgggg cctatgatgc ttgaggtagc acatcttcat 120  
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 atataattta aggagaatcc acactagtac tagtactatg gacctcttga gcttgcctgat 240  
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 taacatagaa ttaaatattac tagattagag tagacattgg caagttgtaa ttgccagttg 360  
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 gaaatgttct caaaa 435

<210> 124  
 <211> 363  
 <212> DNA  
 <213> Homo sapiens

<400> 124  
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cctcctcaga acatgctgct tgcaggaatt caacatcatg gaaaagaata aaggatgggc 120
tctcctggga ggaaaagatg gccatcttca gggactatct ctccttgcca acgcattgct 180
ggaaagaaat cagctccttg cacagaaggt catgtactta ttagtccctc ttcttaaccg 240
agggaatgat aaacataaac tcacatctgc aggccttttt gtggagcttc tccggagtcc 300
agtggccaag agactgcccc gcataacttc tgttgcccgc tttaaagact ggctacaaga 360
tgg 363

```

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<210> 125
<211> 373
<212> DNA
<213> Homo sapiens

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```

<400> 125
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gaagtccgcc cgcgcgccc cgcgcgccc tgacaccgag cggagcgagg aaggaggac 180
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aggaaaaggg aaaagaaggg aagagaaaat ccggccgctg agtcccgcgt ccactcacac 360
ctccgctcgt gcc 373

```

```

<210> 126
<211> 362
<212> DNA
<213> Homo sapiens

```

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<400> 126
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tgacctctcg gcctcggttc ttggactcgg aggtgcccac aggggaaacc caggtttcca 180
gccatgtcca ctaccaccgc caccggcacc accactacaa aaagcgggtc cagaggcatg 240
gcaggaagcc tggcccagaa accggagtcc ccagtcagc gcctcctatt ctcggacac 300
agccccagcc agagccacct tctcctgate agcaagtcac cagatccaac tcagcagccc 360
ct 362

```

```

<210> 127
<211> 351
<212> DNA
<213> Homo sapiens

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<400> 127
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cattctatct ctgcaggatc tcttagctac tgtgacttcg acagataatt tagcctttga      180
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gccaatgtga cggtattaag aggagggggc ttagaggggg attagatcct gaaaggctct      300
tacttttttg agtgacgagg atgcatacga tgaaagcatc tcgtagatac g              351

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```

<210> 128
<211> 374
<212> DNA
<213> Homo sapiens

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<400> 128
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ttccagctca ccttaactgt ttccctggctg actcgccctc cggcctgatt gccctgctca      180
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gactcctggg ctgt              374

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<210> 129
<211> 392
<212> DNA
<213> Homo sapiens

```

```

<400> 129
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tcttttcccc cagcaattaa gtccccccgg ggcttggggg ttgggtttgt cagcttgctt      180
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tctctctagg accaactgcc cctgtaagta cagttttttg gataacctca agaagttgac      300
tcctcgacgc gatgttccca cttaccccaa ggtaagatga gattccggcc cagaagaagc      360
tgcagctgtg tccccagccc cacgccgagc cc              392

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```

<210> 130
<211> 359
<212> DNA
<213> Homo sapiens

```



&lt;400&gt; 130

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tgtggacctc	tttgccccag	gggaggacat	cattggagcc	tccagcgact	gcagcacctg	180
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gatgctgtct	gccgagccgg	agctcaccct	ggcggagttg	aggcagagac	tgatccactt	300
ctctgccaaa	gatgtcatca	atgaggcctg	gttccttgag	gaccagcggg	tactgacct	359

&lt;210&gt; 131

&lt;211&gt; 389

&lt;212&gt; DNA

&lt;213&gt; Homo sapiens

&lt;400&gt; 131

gttagaaaac	aagtttttgg	agcagggtga	tcaattctat	gatgacaact	ttcccatgga	60
aattcgccat	ctgttggccc	aatggattga	aaatcaagac	tggtaggatc	aaacatatatt	120
tccctagaag	ttgatgcaca	aatgtctgat	gctctatcca	tgtgaattta	ttttatggct	180
cactttttac	tcagtagatg	cattcttttc	aggtaaagaa	ctttctcaag	gatttgaaag	240
ccttcccaaa	gaaggggaat	aattgtcctt	tctggttcca	ttcattgtaa	atgaaaagtt	300
aatggttcca	gtgcttcttt	tctctgtaaa	caaaaaccca	aataattttt	catgtattaa	360
aaaaagaagc	aatcaattg	attgtcagt				389

&lt;210&gt; 132

&lt;211&gt; 465

&lt;212&gt; DNA

&lt;213&gt; Homo sapiens

&lt;400&gt; 132

ggaggcagga	gatgoggatg	aagatgaggg	tgatgctaata	agctctgact	gtgaaccaga	60
ggggcccgtg	gaagcggaag	agcctcctca	ggaggatagt	agcagtcagt	cagactctgt	120
ggaggaccgg	agtgaggatg	aggaagatga	acattcagag	gaggaagaaa	caagtggaag	180
ttcagcatca	gaggaatctg	agtctgaaga	gtctgaggat	gcccaatcac	agagccaagc	240
agatgaagag	gaggaagatg	atgatttttg	ggtggagtac	ttgcttgcca	gggatgaaga	300
gcagagtga	gcagatgcag	gcagtgggcc	tcctactcca	gggcccacta	ctctaggtcc	360
aaagaaaagaa	attactgaca	ttgctgcagc	agctgaaagt	ctccagccca	agggttacac	420
gctggccacg	accaggttaa	agacgcccac	tcctctgctt	ctgcg		465

&lt;210&gt; 133

&lt;211&gt; 354

&lt;212&gt; DNA

&lt;213&gt; Homo sapiens

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<400> 133
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ttgccagagt ctttgacaga acttagtcta attcaaacca atatatacaa cataactaaa    120
gagggcattt caagacttat aaacttgaaa aatctctatt tggcctggaa ctgctatatt    180
aacaaagttt gcgagaaaac taacatagaa gatggagtat ttgaaacgct gacaaatttg    240
gagttgctat cactatcttt caattctctt tcacacgtgc caccocaaact gccaaagctcc    300
ctacgcaaac tttttctgag caacaccag atcaaatata ttagtgaaga agat          354

```

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<210> 134
<211> 326
<212> DNA
<213> Homo sapiens

```

```

<220>
<221> misc_feature
<222> (1)...(326)
<223> n = a,t,c or g

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<400> 134
cccacgcgtc cggngacagg cctggccggc ctctgcagag acgtccaacc tcgtgcgcat    60
gcgcagccag gccctgggcc agtcggcgcc ctogctcacc gccagcctga aggagctgag    120
tctccccaga agaggaagtt tccctgtgtg tccaaatgct gggagaacat cacccttggt    180
atgaattgcc accacattaa ataaaatata tccaaagctc nnnnnnnnnn nnnngggggg    240
gccgttttaa aggacccttg gggggggcaa ggtttacgcg ggctggcaag gtaatagttt    300
tttccttata gggagccgaa ttaaaa          326

```

```

<210> 135
<211> 210
<212> DNA
<213> Homo sapiens

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<400> 135
cttctgtgtg tctgtcttcc tgtgggtgcc tgcccgcttc tttctcttct aacagccctt    60
ttgaaccagc tgatgcgctg tcttcggaaa taccaatccc ggactcccag tcccctccta    120
cattctgtcc ccagtgaat agtgtttgat tttgagcctg gccagtggt cagaggtagt    180
tgggctcttc tttcttggtc gacgcggccg          210

```

```

<210> 136
<211> 310
<212> DNA
<213> Homo sapiens

```

<400> 136  
 tttttccaat acacatatata accatcattc actaaaatgt actatatatt caatatatttg 60  
 tgtataactca ctgctttttcc taacgtgaaa aattttaccaa aatgctaatt gtgacttata 120  
 aggtattttaa cagactcccg aaaaaaagca gaatgatcag cgaaatcgga aaagaaaagc 180  
 tgaaccatat gaaactagcc aaggtagtaa taatttcgta tcaacaaaag tactcaattc 240  
 taatgtactt agatagaatt ttctaactca tactaaataa ttagtttgta cacagggatt 300  
 cctgataaag 310

<210> 137  
 <211> 502  
 <212> DNA  
 <213> Homo sapiens

<400> 137  
 cttaaagtga aattttaaaaa gtaataataa ttttttaaaaa tgttttaaagg cttacttttg 60  
 agagacagtt ttacatagct taatatttta tcatttaaagg catggtggag ctggttcctg 120  
 cttccgatac cctcaggaaa atccaagtgg aatatgggtg gacaggatcc tttaaagata 180  
 aaccacttgc agagtggcta aggaaataca atocctctga agaagaatat gaaaaggctt 240  
 cagagaactt tatctattcc tgtgctggat gctgtgtagc cacctatgtt ttaggcattc 300  
 gtgatcgaca caatgacaat ataatgcttc gaagcacggg acacatgttt cacattgact 360  
 ttggaaagtt tttgggacat gcacagatgt ttggcagctt caaaagggat cgggctcctt 420  
 ttgtgctgac ctctgatatg gcatatgtca ttaatggggg tgaaaagccc accattcgtt 480  
 ttcagttggt tgtggacctc tg 502

<210> 138  
 <211> 963  
 <212> DNA  
 <213> Homo sapiens

<400> 138  
 ctctcagtc cctccctagc ctgtcccttc ctccctccgt tgctcctggt ggccaggaga 60  
 gcccttcacc ccacacagct gaggtggaga gtgaggcctc accacctcct gctcggcccc 120  
 tcccagggga agccaggctg gcgcccctct ctgaagaggg aaagccgcag cttgtttggg 180  
 gtttcccaag tgacttcctc caaggaaacc gctgagcctc ttcccttgca gccaacatcc 240  
 cccactctct ctgggttctc aaaaccttca acccctcagc tcacttcaga gagctcagat 300  
 acagaggaca gtgctggagg cgggccagag accagggaag ctctggctga gagcgaccgt 360  
 gcagctgagg gtctgggggc tggagttgag gaggaaggag atgatgggaa ggaaccccaa 420  
 gttgggggca gcccccaacc cctgagccat ccagccccag tgtggatgaa ctactcctac 480  
 agcagcctgt gtttgagcag cgaggagtca gaaagcagtg ggggaagatga ggagttctgg 540  
 gctgagctgc agagtcttcg gcagaagcac ttgtcagagg tggaaacact acagacacta 600  
 cagaaaaaag aaattgaaga tttgtacagc cggctgggga agcagccccc accgggtatt 660  
 gtggccccag ctgctatgct gtccagcgc cagcgccgcc tctccaaggg cagcttcccc 720  
 acctcccgcc gcaacagcct acagcgctct gagccccag gccctggtga gactgcagtc 780

accagcttc	catcttttcc	ctgagacccc	tttctgtoga	ctgtttttct	ccaggccctg	840
ggggctctgcc	ccgggggaat	agacccctc	tccccacctc	ccctttctc	acttagtgct	900
ctccttcccc	catcctggct	ccaggcatca	tgcgaaggaa	ctctctgagt	ggcagcagca	960
ccg						963

<210> 139  
 <211> 376  
 <212> DNA  
 <213> Homo sapiens  
  
 <220>  
 <221> misc\_feature  
 <222> (1)...(376)  
 <223> n = a,t,c or g

<400> 139						
cgccgctttg	tttctcaaga	gactgggaat	ctgtatat	ccaaagtaga	aaaatcagat	60
gttgggaatt	atacctgtgt	ggttaccaat	accgtgacaa	accacaaggt	cctggggcca	120
cctacaccac	taatattgag	aaatgatgga	gtgatgggtg	aatatgagcc	caaaatagaa	180
gtgcagttcc	cagaaacagt	tccgactgca	aaaggagcaa	cggatgaagct	ggaatgcttt	240
gctttaggaa	atccagtacc	aactattatc	tggcgaagag	ctgatggaaa	gccaatagca	300
aggaaagcca	gaagacacaa	gtcaagagt	gggaaanntc	ttgagaaatc	ccttaatttt	360
tcagcaggga	ggatgc					376

<210> 140  
 <211> 968  
 <212> DNA  
 <213> Homo sapiens  
  
 <220>  
 <221> misc\_feature  
 <222> (1)...(968)  
 <223> n = a,t,c or g

<400> 140						
gcaaggggca	gttggatgaac	ttgtctgctc	cagagaat	ttcctggtgt	ggaggcagcc	60
agggaccag	gatgctccg	acctgttacg	tgctctgttc	ccaagctgg	ccccgctcca	120
ggggctggca	gtccctgagc	tttgatggcg	gggccttcca	ccttaagggc	acaggagagc	180
tgacacgggc	cttctgtggt	ctccgctgt	gtgcctggcc	cccactcgtc	actcacgggc	240
tggtgtctca	ggcctggtct	cggcgactcc	tgggctcccg	gctctcaggc	gcatttctcc	300
gagcatccgt	ctatgggcag	tttgtggctg	gtgagacagc	agaggagggt	aagggctgctg	360
tgcagcagct	gcggaccctc	agcctccgac	cactgctggc	agtgccact	gaggaggagc	420
cggactctgc	tgccaagagt	ggtgaggcgt	ggtatgaggg	gaacctcgg	gctatgctgc	480
ggtgtgtgga	cctgtcacgg	ggcctcctgg	agccccccag	cctggctgag	gccagcctca	540
tgacagctgaa	ggtgacggcg	ctgaccagta	ctcggtctcg	taaggagcta	gcctcgtggg	600
tcagaaggcc	aggagcctcc	ttggagctga	gccccgagag	gctggctgaa	gctatggact	660
ctgggcagaa	cctccagctc	tctgcctca	atgctgagca	gaaccagcac	ctccgggcct	720
cctcagccg	cctgcacctg	gtggcacagt	atgcccgggc	ccagcacgtg	cggctcctgg	780

tggatgcgga	gtacacctca	ctgaaccctg	cgctctcgct	gctggtggct	gccctggctg	840
tgcgctggaa	cagcccgggt	gaaggcgggc	cctgggtgtg	gaacacctac	caggcctgtc	900
taaaggacac	attctagcgg	ctggggaggg	atgcanaggc	tgcgcacagg	gccggcctgg	960
ccttcggg						968

<210> 141  
 <211> 306  
 <212> DNA  
 <213> Homo sapiens

<400> 141						
agacggctga	aaagggaggg	gtattgaggg	cggttcagag	ggcgaggaga	ggggcgtaga	60
gaacctgtgg	agaagaagtt	caactggaggg	gcattaggcc	tcgcactatg	tatccagatc	120
atcagtaggg	gaagagaaaa	gatgggcaat	atgtatagtc	agacgagaag	tgggatcaaa	180
cagagggctc	atggagaagt	aggctaccca	ccacataacc	ccatcatagg	attgcaggag	240
atacagctat	agataagaat	atccaccagt	cggtgagtga	gcagatcaag	aagaactttg	300
ccaaga						306

<210> 142  
 <211> 316  
 <212> DNA  
 <213> Homo sapiens

<400> 142						
ccacactcac	atttaataata	ctgttagggt	gtttactttg	aggcaatgtc	atcctcatta	60
gtatagggca	ttataattcct	gaatagcaga	atactcctcc	attcatgaag	ttcagtatta	120
tacattctta	ttattgcaca	acaaatagaa	gactttggat	ttccttataat	aagtaccttg	180
acagatgact	aaccattttt	tcctatgctt	tacaactatg	atcagtaact	gtaatttttt	240
taaaggtcct	cctggacccc	cgggtgaaaa	aggagatcga	ggtcccactg	gagaaagtgg	300
tccacgagga	tttcca					316

<210> 143  
 <211> 339  
 <212> DNA  
 <213> Homo sapiens

<400> 143						
gacaatacca	aatgaatgaa	cgtgactgtg	ttccaacaaa	actttattta	caaaaacagg	60
gatgggccgg	atgtagccag	aggccataat	ttgccaaccc	ctgattttaga	cgaaggaaag	120
gagcagtgc	tcactgcttt	taaattaatt	ctgtattctc	acaaggccta	cattgaaatg	180

gaattatagc	ctcatttttt	ottagaacct	ttatattttg	ttttattcat	atacagggtt	240
gtcaagctgg	acagactatt	aaagttcaag	tctcctttga	tttgcttagt	ctgatgttta	300
catttgtaag	tccatgtacc	aacgatttaa	tcatacacg			339

<210> 144  
 <211> 2018  
 <212> DNA  
 <213> Homo sapiens

<400> 144

acaagttatc	tgtgaatcat	aggagaacac	atcttacaaa	actcatgcac	actgttgaac	60
aagctacttt	aaggatatcc	cagagcttcc	aaaagaccac	agagtttgat	acaaattcaa	120
oggatatagc	tctcaaagtt	ttcttttttg	attcatataa	catgaaacat	attcatcctc	180
atatgaatat	ggatggagac	tacataaata	tatttccaaa	gagaaaagct	gcatatgatt	240
caaatggcaa	tgttgcagtt	gcatttttat	attataagag	tattggtcct	ttgctttcat	300
catctgacaa	cttcttattg	aaacctcaaa	attatgataa	ttctgaagag	gaggaaagag	360
tcatatcttc	agtaatttca	gtctcaatga	gctcaaaccc	accacatta	tatgaacttg	420
aaaaaataac	atttacatta	agtcacgaa	aggtcacaga	taggtatagg	agtcctatgtg	480
cattttggaa	ttactcaoct	gataccatga	atggcagctg	gtcttcagag	ggctgtgagc	540
tgacatactc	aaatgagacc	cacacctcat	gocgctgtaa	tcacctgaca	cattttgcaa	600
ttttgatgtc	ctctgggtcct	tccattggta	ttaaagatta	taatattctt	acaaggatca	660
ctcaactagg	aataattatt	tcaactgattt	gtcttgccat	atgcattttt	accttctggt	720
tcttcagtga	aattcaaagc	accaggacaa	caattcacaa	aaatctttgc	tgtagcctat	780
ttcttgctga	acttggtttt	cttggtggga	tcaatacaaa	tactaataag	ctcttctggt	840
caatcattgc	cggactgcta	cactacttct	ttttagctgc	ttttgcatgg	atgtgcattg	900
aaggcataca	tctctatctc	attgttgtgg	gtgtcatcta	caacaaggga	tttttgcaca	960
agaatttttta	tatctttggc	tatctaagcc	cagccgtggg	agttggattt	tcggcagcac	1020
taggatacag	atattatggc	acaaccaaag	tatgttggct	tagcaccgaa	aacaacttta	1080
tttgaggttt	tataggacca	gcatgcctaa	tcattcttgt	taatctcttg	gcttttggag	1140
tcacatata	caaagttttt	cgtcacactg	caggggttgaa	accagaagtt	agttgctttg	1200
agaacataag	gtcttgtgca	agaggagccc	tcgctcttct	gttccttctc	ggcaccacct	1260
ggatcttttg	ggttctccat	gttgtgcacg	catcagtggg	tacagcttac	ctcttcacag	1320
tcagcaatgc	tttccagggg	atgttcattt	ttttattcct	gtgtgtttta	tctagaaaga	1380
ttcaagaaga	atattacaga	ttgttcaaaa	atgtcccctg	ttgttttggg	tgtttaagggt	1440
aaacatagag	aatggtggat	aattacaact	gcacaaaaat	aaaaattcca	agctgtggat	1500
gaccaatgta	taaaaatgac	tcacaaaatt	atccaattat	taactactag	acaaaaagta	1560
ttttaaatca	gtttttctgt	ttatgctata	ggaactgtag	ataataaggt	aaaattatgt	1620
atcatataga	tatactatgt	ttttctatgt	gaaatagggtc	ctgtccaaaa	atagtattgg	1680
ccagatatatt	gggaaaagta	aattgggttt	cctcaggagg	tgatatcccc	ttgcacccaa	1740
gggaaaagat	tttctttcta	acacgagaag	tatatgaatg	tcctgaaggg	aaaccctggg	1800
ccttgatatt	tctgtgactc	gtgttgccct	tgaaactagt	cccctaccac	ctcggtaatg	1860
agctccatta	cagaaaagtg	aacataagag	aatgaagggg	cagaatatca	aacagtgaaa	1920
agggaatgat	aagatgtatt	ttgaatgaac	tgttttttct	gtagactagc	tgagaaattg	1980
ttgacataaa	ataaagaatt	gaagaaacaa	aaaaaaaa			2018

<210> 145  
 <211> 429  
 <212> DNA  
 <213> Homo sapiens

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<400> 145
ggcacgaggg aagctgcccc gtccagggtc atgttcctct tatttctcct cactgtgtgag 60
ctggctgcag aagttgctgc agaagttgag aaatcctcag atggtcctgg tgetgcccag 120
gaacccacgt ggctcacaga tgtcccagct gccatggaat tcattgctgc cactgaggtg 180
gctgtcatag gcttcttcca ggatttagaa ataccagcag tgcccatact ccatagcatg 240
gtgcaaaaat tcccaggcgt gtcatttggg atcagcactg attctgaggt tctgacacac 300
tacaacatca ctgggaacac catctgcctc ttctgcctgg tagacaatga acaactgaat 360
ttagaggacg aagacattga aagcattgat gccacccaaat tgagccgttt cattgagatc 420
aacagcctc . 429

```

```

<210> 146
<211> 717
<212> DNA
<213> Homo sapiens

```

```

<400> 146
gatgaaactt ccggtctcat tgtccgggaa gtgagcattg agatttcgcg ccagcaagtg 60
gaagaactct ttggacctga agattactgg tgccagtgtg tggcctggag ctacgcgggt 120
accacaaaaga gccggaaggc gtatgtgcgc attgcatagg aactcatgac ctgacatcca 180
ttagcagagt catcagagtc atctggctgc tgtgttgaga atggaccatg ctgggcaagg 240
ggagaagcag gaagaccagt gatgagactg cagctatgag agatgttaag ctactgtaga 300
ttggaagcag tggaggtggg gaggccagga tttcagatat atttaaaagt agagataaca 360
gcttttgttg agaccttgga tgtgtgatgt gagagaaaga agagaaagga tgattttgaa 420
agggcctaag cctttatcca aggatttctt tcaaagtgtt ttagtgaagc cattcctgcc 480
tcacagaggg aggaggctgg gcatttcctt ctcaataact tcagagcagt ttgtccatac 540
ccctaataata gtgcttgtct catttcgaat tatattcact cgtaaaattt gtgtttcatg 600
ccagtgaagt ccatgagatc aagaattcta ttgtacttaa ttttataatc ctctgtctta 660
gcacaatacc tagagtatca cagatgttta acaattttct tgaattaaaa ctgttat 717

```

```

<210> 147
<211> 367
<212> DNA
<213> Homo sapiens

```

```

<400> 147
ggcacgagat cgattcatgt aaagctggac gtgggcaagc tgcacacca gcctaagtta 60
gcggcccagc tcaggatggg ggacgacggc tctggggaagg tggagggcct acctgggatt 120
tgaccagagt ccgcctgggt ccaggctctg ccaccacag gaagaagaaa ctacactgac 180
agatgtgaga cagtgtttcc ccttcagtct ttgaacaggc tttgtgtttt ctaaatagaca 240
ctggataaaa ggaattcat tcaagagctc caaggcttcc ctttccgccc ggcttctgtt 300
gccctggcct gagcagcgag cagctgggag gggactgaac tgcccctaac cagggttgtg 360
gctggcg 367

```

<210> 148  
 <211> 791  
 <212> DNA  
 <213> Homo sapiens

<220>  
 <221> misc\_feature  
 <222> (1)...(791)  
 <223> n = a,t,c or g

<400> 148  
 cgagacccga ccctggggcgt ggtgcatcga ggtagatgca aagatgctgg ccagagcaag 60  
 tgtcgccctgg agcggggtca agccctggag caagccaaga agcctcagga agctgtgttt 120  
 gtcccagagt gtggcgagga tggctccttt acccaggtgc agtgccatac ttacactggg 180  
 tactgtctggt gtgtcacccc ggatgggaag cccatcagtg gctcttctgt gcagaataaa 240  
 actcctgtat gttcaggttc agtcaccgac aagcccttga gccagggtaa ctcaggaagg 300  
 aaagatgacg ggtctaagcc gacaccacg atggagaccc agccggtgtt cgatggagat 360  
 gaaatcacag ccccaactct atggattaaa cacttgggtga tcaaggactc caaactgaac 420  
 aacaccaaca taagaaattc agagaaagtc tattegtgtg accaggagag gcagagtgcc 480  
 ctggaagagg ccagcagaa tccccgtgag ggtattgtca tccctgaatg tgccccctggg 540  
 ggactctata agccagtgc atgccaccag tccactggct actgctggtg tgtgctggtg 600  
 gacacagggc gcccgctgcc tgggacctcc acacgctacg tgatgccag ttgtgagagc 660  
 gacgccaggg ccaagactac agaggcggat gacccttca aggacaggga gctaccaggc 720  
 tgtccagaag ggaagaaaat ggagtttatc accagcctac tggatgctct caccactgac 780  
 atggntcagg g 791

<210> 149  
 <211> 335  
 <212> DNA  
 <213> Homo sapiens

<400> 149  
 ggcacgagca aactcggggc tcagcttggg gacgggagtt gatagtcagg tgccctggaac 60  
 ataatggaga ccgtccatat tggttgaatg agtggatgaa tgaattaatg aatttctttt 120  
 ctcttaagtc ctgcagctga ttaagtcaca gaaatttctg aataagttgg tgatcttggg 180  
 ggaaacggag aaggagaaga tcctgcggaa ggaatatgtt tttgctgact ccaaagtaag 240  
 tgacagcaaa cttctaaagt gggctgtgag gtagggaggg gacacaagcg ttttgaggct 300  
 cgctgtgtgc cagggagtgt atcattagct cactc 335

<210> 150  
 <211> 1293  
 <212> DNA  
 <213> Homo sapiens



<400> 150  
 cgacgcctgt cctctcttaga cttgcagctc ggtcctcttg gcagagaccc cccgcaggag 60  
 tgcagcacct tctccccaac agacagcggg gaggagccgg ggcagctctc cctggcgctg 120  
 cagttccagc ggcggcagaa ccagcgcgcg ttctccatgg aggacgtcag caagaggctc 180  
 tctctgccc tggatatccg cctgccccag gaattcctac agaagctaca gatggagagc 240  
 ccagatctgc ccaagccgct cagccgcgat tcccgcggg cctccctgtc agacattggc 300  
 tttgggaaac tggaaacata cgtgaaactg gacaaactgg gagagggcac ctatgccaca 360  
 gtcttcaaag ggcgcagcaa actgacggag aaccttgtgg ccctgaaaga gatccggctg 420  
 gagcacgagg agggagcgcc ctgcaactgcc atccgagagg tgtctctgct gaagaacctg 480  
 aagcacgcga atattgtgac cctgcatgac ctcatccaca cagatcggtc cctcaccttg 540  
 gtgtttgagt acctggacag tgacctgaag cagtatctgg accactgtgg gaacctcatg 600  
 agcatgcaca acgtcaagggt gaggcctcgg gggcaggggc ccccatctt ggcagccacc 660  
 tgtccagaag ccagtggtgg ggacccactc tcaccaccag ggatccggct gctgagggtg 720  
 ctcaaactt cccacgtagg aaagaggagg agggcaatgc catcaacgag tccaggaact 780  
 ggggttgagcg ctttaccacca agaacagaca cacactgtct gccactgtct agctgttggc 840  
 ataaaaccca ctctcaactc tgaacatcag ttcccgatc tgtcaaatgg gagtgtgagc 900  
 tacctgccc aatgcaggga ggcttctggg gaagctcggg gttatgaatg acctctcctg 960  
 gtgtttgtta aagaatcaag actgggcatg gtggcccacg cctgtaatcc cagcactggg 1020  
 agggcaaggc aggaagatgg cttgagccca ggagtttgag accagcctgg gcaacatggc 1080  
 aagacctcat ctctactaaa aattgaaaaa ttagccgggc acagtagcgt gcacccatag 1140  
 tcccagctgc ttgagaggct gaggcaggag ggccacttga gcccgggagg ttgaggctgc 1200  
 agtgagccat gatcacacca ctgcaactcca gcatgggtga cagagtaaaa ccctgacatg 1260  
 tattgcgggc gctctagagg ataacaagca tac 1293

<210> 151  
 <211> 349  
 <212> DNA  
 <213> Homo sapiens

<400> 151  
 ggcacgagcg gcacgagcct tctcctactg cattagcatt tggggaccac cctattgtac 60  
 aaccaaagca attatccttt aaaattattc aggtaaatga taattaaaat gtttttttct 120  
 atggcttcta agaaaccatt gactaactta ctaacaacta agatgtctgt ttgttttata 180  
 tgtagtcata aagcagaatt acacatcaag aaagataact tactaaacaa aaacaacaga 240  
 attttagga aggagtgaga aactgaaaca cacaatttac tatcagcttt ttaaacaacc 300  
 gttaacatgt cagttctggt tactgattct ttctgaactt aatttccag 349

<210> 152  
 <211> 324  
 <212> DNA  
 <213> Homo sapiens

<400> 152  
 ggcacgagga ccttccttgc tttcagaatt tcacccaggg tctgacaggc ctcaagaaag 60  
 gagaactagt tatgaacoga ttcatccagg cccatcccca gtggatcatg attcactgga 120  
 atcgaagcga ccacgtctgg aacaggcttc tgattctcat tatcaggggc acatcactgg 180  
 cgaatcccta ccaggacgtg tacactagca gctcctcact gtggaatctg atgggcaatg 240

ccatgggtgat	tacccactat	atccgtctta	ccccatatgt	tcaaagtaaa	ctcggttccc	300
tagggaacct	gatgccatgt	tacc				324

<210> 153  
 <211> 377  
 <212> DNA  
 <213> Homo sapiens

<400> 153						
ggcacgagaa	aagaagaatt	cagtgcagaa	gaaaattttc	tcatttttgac	ggaaatggca	60
accaatcatg	tacaggttct	tgtagaattc	acaaaaaagc	taccagggtat	tttttaaata	120
atcacagtta	atatattattg	agagtttaaa	tatgtgcca	cagattagat	tacctatttt	180
acatacggtg	ttttaattttt	caaaacattc	ctgtgagatc	agctctattt	tcactattac	240
tttgccaagt	attttcacat	gtacttattt	cactgctatt	ctctacaata	gtcttgtagc	300
attgagaaag	gcaggctctgt	tctttgtaaa	atgaaaatca	tttaatatct	gatttaaagt	360
aactgtcgaa	ctactat					377

<210> 154  
 <211> 1224  
 <212> DNA  
 <213> Homo sapiens

<400> 154						
ggtttttttt	ttttttcttt	tgggaaaggc	attggccact	ttggacttta	ttagcaacag	60
taatgtcccc	tgacatacgc	acaagcttgt	agctccacgg	ccaggctctc	ccccaacctc	120
acaatggccc	cgtgatgcag	gcaggcaggc	gagtgggggt	ctccctcct	tatccacagg	180
gccaccgaaa	ggcccacgag	acggccttgc	ccgaggtcac	ccagcggagt	ggcttgctgg	240
gagccctggg	aataacagtc	ccacacaagg	ctctctccct	ccgcagctgg	acctgtacgc	300
gggggctctg	tttgtgcaca	tctgcctggg	ctggaacttc	tacctctcca	ccatcctcac	360
gctcggcatc	acagccctgt	acaccatcgc	aggtatgggtg	cctgcagcag	ggagggtccac	420
ccaggggacg	tgtaaagggg	tcagaaggcc	acctccccct	acaggcccga	gggagcagcc	480
caggaagtgg	cccagcagg	agcccagaa	gttccctccc	gtgtccctcc	tccttggggc	540
cagggccccc	tccagcaacc	ttgcttccac	tggcaggggg	cctggctgct	gtaatctaca	600
cggacgccct	gcagacgctc	atcatgggtg	tgggggctgt	catcctgaca	atcaaagggtg	660
aggacagagt	ctgtggccat	ggcggggctg	tccccacagc	gagccctttg	gagtctggca	720
ctgcccggca	ctgtgcagga	ttcatgccgt	tgggggttctg	ggtagcatcg	ctgggagtgg	780
gtgggttcag	gaggttgagc	cactaggcag	tcagccccc	tgctggcccc	tcagggactg	840
ccctggctgg	tagaggctac	ccaccctgct	gccccgctgt	taccagctct	ggccctggca	900
aggagctgac	tcaggaaactc	agggccagcc	acacccgcac	tggctcagcg	cttgatgggtg	960
aggtggggct	gtaggcgggt	gtgaaggcac	acaaccagga	ggccataaaa	ctgcctgggc	1020
agctcctcca	attgttttaa	agcatgtaca	aaatgccaaag	aggtgatgct	acctcctgca	1080
ggacaaaggc	cagggaggaa	agaagagagc	tgggagagat	tggcgatact	agtctggaac	1140
agataggaaa	ctcacagggc	tgcccggaga	gagcgtgagc	tcaccgtccc	tggaagtatg	1200
taagcagagc	caggagctcg	tgcc				1224

<210> 155  
 <211> 345  
 <212> DNA  
 <213> Homo sapiens

<220>  
 <221> misc\_feature  
 <222> (1)...(345)  
 <223> n = a,t,c or g

<400> 155  
 ggcacgagcg gcacgagatc tgaagaggta tattgcttac agaaagagcg ggagatggta 60  
 aatcacagtc ttcaagagac ttctgagcaa aacgttattc tacagcatatc tcttcagcaa 120  
 cagcagcaaa tgttacaaca agagacaatt agaaatggag agctagaaga tactcaaact 180  
 aaacttgaaa aacaggtgtc aaaactggaa caagaacttc aaaaacaaag ggaaagtcca 240  
 gctgaaaaagt tgagaaaaat ggaggagaaa tgtgaatcag ctgcacatga agcagatttg 300  
 aaaaggcaaa aagtgtattga gcttactggc actgccaggc aagtn 345

<210> 156  
 <211> 340  
 <212> DNA  
 <213> Homo sapiens

<400> 156  
 ggcacgagct tctacttgta caggaaaggc tacttgagtt tgtccaaagt ggtgccgttt 60  
 tctcactatg ctgggacatt gctgctactt ctggcacgtg tggcctgcct cctaggcatt 120  
 gtccgctggg cctacccccca cttcccgagc tttctcgcca tctcctctcc gatccatctc 180  
 tacctgacgt cataactcta tatgcatgtt atgcgggtcca tcttagtctt ctaaaaaggc 240  
 cattttagct tacctgccat caagctatac atgtggaaat atacactgta ttattttccc 300  
 tttccagggtg attacttacc tcatctgttc ttatatctgc 340

<210> 157  
 <211> 478  
 <212> DNA  
 <213> Homo sapiens

<220>  
 <221> misc\_feature  
 <222> (1)...(478)  
 <223> n = a,t,c or g

<400> 157  
 gagactccaa gccccagttt cacctcagag gcagagatga ggggtccccc ggtcctgttc 60

ctccaggccg	ccccaatgga	gtgtcctgtt	ccgcagggga	tcccggccgg	gtccagtect	120
gagcctgcac	ctgaccccc	ggggcctcat	ttcctccggc	aggagcgcag	cttcgagtgc	180
cgcattgtgcg	gcaaggcctt	caagcgtctg	tccacgctgt	ccaccacact	gctcatccac	240
tcagacacgc	ggcctaccc	ctgccagttc	tgcggcaagc	gtttccacca	gaagtccgac	300
atgaagaagc	acacctacat	ccacacaggt	gagaagccgc	acaagtgcc	gggtgtgcgga	360
aaggccttca	gccagagctc	caacctcatc	acccacagac	tcagagagaa	cccaccatgg	420
tgctgtctcc	tgccgacaag	accaacgtca	aggccgcctg	gngtaagggt	cgcgcgca	478

<210> 158  
 <211> 332  
 <212> DNA  
 <213> Homo sapiens

<400> 158						
ggcacgagca	gctcaccaac	aacacagcca	ctgccccctc	tgccacgccc	gtgtttgggc	60
aagtggcagc	cagcaccgca	ccaagtctgt	ttgggcagca	gactggtatc	acagccagca	120
cagcagttgc	cactccacag	gtaatcagct	caaggttcat	taatctagat	ttttagtata	180
tagtattatt	gaatataat	aatgttttat	atattagact	ttatacttga	gacataggaa	240
ataatttatg	tataactgtt	aattaaattt	tatatattgt	agattagaaa	attctattaa	300
tttattaatg	aattatatct	aattatgtga	ca			332

<210> 159  
 <211> 868  
 <212> DNA  
 <213> Homo sapiens

<400> 159						
cccacgcgtc	cggaataaag	agagaactct	gttactattg	tttttacatc	accaaataat	60
tatttaatat	cgtttagctaa	gagaagaatt	ggctatgaac	tgtactttta	caactgacac	120
aactgcatac	aagttataaa	gtttaataat	ctttatcatc	ttggaaaata	aatctcttct	180
tgctaagtat	cagtttttaa	aaattgcccc	atgtattaga	tatgtatttt	tttaacaaaa	240
atgttctgtg	tattaattat	tttgaaataa	attttaagtt	cacaaaaagc	cattacaaga	300
agtggaaata	gcagcaatta	cacatgggtg	tcttcagggg	ttagcctact	tacattctca	360
tactatgatt	catagagata	tcaaagcagg	aaatatcctt	ctgacagAAC	caggccaggt	420
gaaacttgct	gactttggct	ctgcttccat	ggcatcacct	gccaatccct	ttgtgggaac	480
gccgtatttg	atggccccag	aagtaatttt	agccatggat	gaaggacaat	atgatggcaa	540
agtagatgtg	tggtctcttg	gaataacatg	tattgaacta	gcggaaagga	agcctccttt	600
atttaatatg	aatgcaatga	gtgccttata	tcacatagcc	caaaatgaat	cccctacact	660
acagtctaata	gaatgggtgag	tattgttaata	atataatattg	ctcagtgttg	aataaatgaa	720
atgctttttc	ataatctgtt	atcaaagtga	tttaatttca	gttaggtaaa	atgtatcacc	780
ttataagata	ttaaaataga	tgtattttac	ccttttaaat	atatttatcc	tttatcatgt	840
ttccatttca	tggcatacgt	ataactgg				868

<210> 160

<211> 1404  
 <212> DNA  
 <213> Homo sapiens

<400> 160

gcgccacgcg	cgccctggcg	gcggcgccca	ctctaaccag	cgcaaaatgt	ccctggaaca	60
ggaggaggaa	acgcaacctg	ggcggtcct	aggacgcaga	gacgccgtcc	ccgccttcac	120
tgagcccaac	gtgcgcttct	ggatcaccca	gcgccaatcc	tttattcgac	gatttcttca	180
atggacagaa	ttattagatc	ctacaaatgt	gttcattttca	gttgaaagta	tagaaaactc	240
gaggcaacta	ttgtgcacaa	atgaagatgt	ttccagccct	gcctcggcgg	accaaaggat	300
acaggaagct	tggaaagcga	gtcttgcaac	agtgcacccc	gacagcagca	acctgatccc	360
caagcttttt	cgacctgcag	cgttcctgcc	tttcatggcg	ccacgggtat	ttttgtcaat	420
gacgccactg	aaagggatca	agtccgtgat	tttacctcag	gttttctctc	gtgcctacat	480
ggcagcgctc	aacagcatca	atggaaacag	aagttacact	tgtaagccac	tagaaagatc	540
attactaatg	gcgggagccg	ttgcttcttc	aactttctta	ggagtaatcc	ctcagtttgt	600
ccagatgaag	tatggcctga	ctggcccttg	gattaaaaga	ctcttacctg	tgatcttctc	660
cgtgcaagcc	agtgggaatga	atgtctacat	gtcccgaagt	cttgaatcca	ttaaggggat	720
tgcggtcatg	gacaaggaag	gcaatgtcct	gggtcattcc	agaattgctg	ggacaaaggc	780
tgtagagaa	acgctagcat	ccagaatagt	gctgtttggg	acctcagctc	tgattcctga	840
agtcttcacc	tactttttta	aaaggaccca	gtatttcagg	aaaaaccag	ggtcatttgt	900
gattttgaaa	ctgtcttgta	ctgtcctggc	aatgggactg	atggtgccat	tttcttttag	960
tatatttcca	cagattggac	agatacagta	ctgtagtctt	gaagagaaaa	ttcagttctc	1020
aacagaagaa	acagaaatct	tttatcacag	aggggtgtag	gccgtgagtt	ttagggtgaat	1080
ttatgtggtt	ccctgcttga	aaaccttccc	cctctcccag	gttcggttta	gagaactttg	1140
cccacaggtc	ttctggggac	cccagagggtg	tctgtgctga	caaggcgact	tcagattcca	1200
tactgagatc	gttcccaggc	tggcgtctct	gggggtttta	aggctggctg	gagaagacag	1260
tgggaagggt	gccccgtctg	acacccttgg	gggtgctgag	ggaacgggtt	gagtggggat	1320
cggcctgcga	aaggatactg	tgaatcact	aattaactaa	taaacctgtc	tcaagttgag	1380
gatttgaaga	aaaaaaaaaa	aaag				1404

<210> 161  
 <211> 562  
 <212> DNA  
 <213> Homo sapiens

<400> 161

cccacgcgtc	cgggagattg	gaagtcttct	ataacgggac	ctggggcagc	gtcggcagga	60
ggaacatcac	cacagccata	gcaggcattg	tgtgcaggca	gctgggctgt	ggggagaatg	120
gagttgtcag	cctcgccctt	ttatctaaga	caggctctgg	tttcatgttg	gtggatgaca	180
ttcagtgctc	taaaacgcat	atctccatat	ggcagtgcct	gtctgcccc	tgggagcgaa	240
gaatctccag	cccagcagaa	gagacctgga	tcacatgtga	agatagaata	agagtgcgtg	300
gaggagacac	cgagtgtctc	gggagagtgg	agatctggca	cgcaggctcc	tggggcacag	360
tgtgtgatga	ctcctgggac	ctggccgagg	cggaagtggg	gtgtcagcag	ctgggctgtg	420
gctctgctct	ggctgccctg	agggacgctt	cgtttggcca	gggaactgga	accatctggg	480
tggatgacat	gcggtgcaaa	ggaaatgagt	catttctatg	ggactgtcac	gccaaacct	540
ggggacagag	tgactgtgga	ca				562

<210> 162

<211> 1812  
 <212> DNA  
 <213> Homo sapiens

<400> 162

gccttgcttg	gaggcaaagc	gtcctccact	ctgtccctcag	gactcagctg	tgtggcccttg	60
gatttctttt	tgcgggactt	gcgccctttg	ggtgccaaag	gtccaggatc	cccctggaac	120
cagatggtag	ggccatgccc	gtcctgcagg	gagctcatgc	ctggcatgcc	atagcagcgc	180
agccaggctc	gaaaggcagc	aaagtctctc	tccccgtctc	ctgacccgta	gcccctgccc	240
cccaactgga	ccacttccct	gggcaactgag	tgacatagct	ccagcaggctc	tggattctgc	300
agcttggtcc	ttatcttctg	gctcagggtc	agctccgggc	tcggcctgtg	ctgctgcagg	360
gcctccagga	ccgagcgggc	cttctcaaag	ggggggatct	tcagccggta	caggatctct	420
gcccgcagat	agttgccaat	gccattgaag	aacctctggg	ccaggagggc	ctcgcagatg	480
ggccgggtcaa	aggccttata	cgctagggtt	cgtagcacat	tctccctgaa	ctgctggtac	540
tcttgcaaga	cacagggccc	gcggcccggc	tgccactttc	ccccaaaggc	ccagcggccg	600
aaccggcgga	tgtccacgaa	acataggcgc	agccgggggc	caggcggggc	cgtgtaaaag	660
cgcagggtgg	catggcgtgg	cagctcctcg	cggggcacca	gctgaaaaga	gccggacatg	720
ccgaagcgga	agaccagggc	cagtggctcc	tgttggggct	gggccccagg	cagagggtct	780
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ctgaggggagg	gtggcagagt	cctggctggg	aggtggcgga	agaacctgac	ttcccactgc	1020
ctggcgccgg	cgagatgcgg	gggcaggctc	gaggccccgg	gtcgccgctg	tctctgcggg	1080
tgggggaagt	cacccagcta	gcgtgggaca	gggtcggcac	ccccagcagg	aaacagcagc	1140
gacgagccag	agcggagtcg	cctgcagctg	cgcgcaggac	gtgcacaggc	gcgcgggtac	1200
cacaggccct	agggacccgg	tggggatctt	aagcaccaac	gaacagtcag	acctaactca	1260
taaacaaaaca	tcatcacggc	ctgcctgtgc	agaagcgcag	ccaagcaaca	acaacaacaa	1320
aaaaaggcga	ggaggtagac	ccacttgaga	tggttctgtt	gcggagagtc	tctgaaatca	1380
gaaagcgcca	gtccgcacaa	acgaggaaac	ccgacgtgtc	cggcggaagg	aaccgccagt	1440
acaaaggccc	tgaggcgaga	aagagattgg	tactgaaaag	aactcaaaga	agtcctgtgt	1500
ggctggagta	tagctgcggg	ttagtgtctg	cagggtgaaga	cagagaagca	aaccaggtc	1560
aggtccggtt	gggcctcggg	agggcctccg	tgtggagtct	gcacttcatt	ctaagtgtat	1620
acctaaccac	tcgccacgat	ttcccctcct	tcacactacc	ctgctacgtc	tccttattag	1680
gcgtaataaaa	attatgtggc	tttgtaagaa	attggttttt	agagatgcat	gttaaagtat	1740
tgggtatgaa	atgtcatgat	ttgtctaatt	taotttaaaa	tacttctgcc	ataataaatg	1800
aatagaatta	ac					1812

<210> 163  
 <211> 333  
 <212> DNA  
 <213> Homo sapiens

<400> 163

agctgacgtg	gtctgcctgt	tattggagag	atatattaag	aatccagttg	tggattgcag	60
ctgatattct	tttgcaatg	cttgaaaaag	cacttcttta	tagtgaacac	cagaacatca	120
gcaacactgg	actgtcatcc	caaggcttat	tgatatttgc	ggagttgatt	cctgccatta	180
agaggacgtt	ggctcgccct	ctcgtgatca	ttgcgagcct	ggactatggc	attgagaaac	240
ctcatttagg	aacaggcatg	caccgtgtga	tcggactgat	gcttctatac	ttaatctttg	300
caaatgctga	aagcgtgatt	agagtcattg	ggg			333

<210> 164  
 <211> 134  
 <212> DNA  
 <213> Homo sapiens

<400> 164  
 tttttttttt gagatggagt ctcgctctgc tgcccaggct ggagtgcagt ggtgcaatct 60  
 tggctcactg caagctctgc ctcccagggt caccgccattc tctgcctca gcctcccag 120  
 tagctgggac taca 134

<210> 165  
 <211> 839  
 <212> DNA  
 <213> Homo sapiens

<400> 165  
 cctgagcccg gcgagcagga gaggaggtct tccggggccgc ggccctccgag cgcgcgggat 60  
 ttgcagaact taatatgaat gtgaagaact tgcaaagaaa cttgaaaaca gccaaagggga 120  
 tggcatatca agaaataaat tggccttggc agaattgtat gaagatgaag tgaagtgcaa 180  
 atctttccaag tctaataagac ctaaagccac agtcttcaag agccacgga caccacctca 240  
 acggtttttac tcaagtgaac atgaatacag tggattaaat atagtctgac cttcaactgg 300  
 gaaaattgtg aatgaacttt tcaaagaggc aagggaacat ggggctgtcc ctctgaatga 360  
 agccacaaga gcttcagggtg atgataaatc taagtcattt acagggtggag gatacagatt 420  
 gggtagttct ttttgtaagc ggtctgaata tatctatgga gaaaatcagc tgcaagatgt 480  
 tcagattttg cttaaactgt ggagcaatgg tttcagttta gatgatggag aattgagacc 540  
 ttacaatgaa ccaacaaatg ctcaatttct ggagtctgtt aagagagggg tgactctcat 600  
 tgcattgtat cctgaaatto agcaacttat gttagaaatc ttttaattgtg gcattactgc 660  
 tggcagaaga tttcaaaagg ttagtttgaa gttataattt gtgaaagtaa actcagatat 720  
 tcagtgtctc caccatcca aagaacattg taacttacca gctcttcttg ctaaaggatg 780  
 aggaatcaag tgattttgct atgataataa aagcttttct gtgttatgat taaaaaaaa 839

<210> 166  
 <211> 1256  
 <212> DNA  
 <213> Homo sapiens

<400> 166  
 ctcgatcacc tgatggccct gcggcgcagc tccgggggtg acccacgcgt ccgagcggat 60  
 gttcactctc acgaccatga ttcaagctct tgcacctgtt atgggatggg acaggaagcc 120  
 actgaagatg ttttcatcag aagagatgag aggacatctt catcatcatc ataaatgtct 180  
 gacgaagatc ctgaagggtg aggggcaggt tccagatctg ccattcctgc tgcccctgac 240  
 tgacaacacc cgcattgctg cctctatcct catcaacatg ctctatgatg acctgcgctg 300

tgacccggag	cgcgatcact	tccgcaagat	ctgtgaggaa	tatatcacgg	gcaagtttga	360
ccccaggac	atggacaaga	acttgaatgc	catccagaca	gtgtcaggga	tcctgcaggg	420
cccctttgac	ctgggcaacc	agctgctggg	actgaaaggt	gtgatggaga	tgatgggtggc	480
actatgtggc	tcagagcgcg	agacggacca	gctgggtggc	gtggaggccc	tcattccatgc	540
ctccacgaag	ctcagccgcg	ccaccttcat	catcaccaat	ggagtgtcac	tgctcaaaca	600
gatctacaag	accacaaaaa	atgagaagat	caagatccgc	acactgggtg	gactctgtaa	660
gctcggctct	gcaggtggca	cagactacgg	tctcaggcag	tttgcggaag	ggtcgacaga	720
aaaactggcc	aaacagtgtc	gcaagtggct	gtgcaatatg	tccatagaca	ctcggaccgc	780
acgctgggca	gtggaggggc	tggcctacct	caogctggac	gctgatgtga	aggacgactt	840
tgtccaggac	gtccctgccc	tgcaggccat	gtttgagctg	gccaagacca	gtgacaagac	900
catcctgtac	tcgggtggcca	ccaccctggt	gaactgcacc	aacagctacg	atgtcaagga	960
ggcatcatcca	gagcttgtcc	agctcgccaa	gttctccaag	cagcatgtgc	ccgaggaaca	1020
ccccaggac	aagaaggact	ttatagacat	gcgggtgaag	cggcttctga	aggcgggtgt	1080
catctctgcc	ctggcttgca	tgggtgaaagc	agatagtgcc	atcctcactg	accagaccaa	1140
ggagctgctg	gccagggtat	tcctggcact	gtgtgacaac	ccaaaggacc	gaggcaccat	1200
tgtggctcaa	ggtggtggca	aggccctgat	tccctggct	ttggagggca	cagatg	1256

<210> 167  
 <211> 892  
 <212> DNA  
 <213> Homo sapiens

<400> 167						
atgtggacag	cgtgggtggc	ggcagcgagt	ctcggctccct	ggactcacc	acttccagcc	60
caggcgctgg	cacgaggcag	ctggtgaagg	cttcgtccac	aggcactgag	tcctcagatg	120
actttgagga	gcgagaccct	gacctgggag	acgggctgga	gaatgggctg	ggcagcccct	180
tcgggaagtg	gcactgtcc	agcgcggctc	agaccacca	gctgcggcga	ctgcggggcc	240
cagccaagtg	ccgcgagtgc	gaagccttca	tggtcagcgg	gacggagtgt	gaggagtgtc	300
ttctgacctg	ccacaagcgc	tgcctggaga	ctctcctgat	cctctgtgga	cacaggcggc	360
tcccagccc	gacacccctt	tttggggttg	acttccctgca	gctaccagc	gacttcccgg	420
aggaggtacc	ctttgtggtc	acgaagtgc	cggctgagat	agaacaccgt	gccctggatg	480
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ccttcattct	tctggctaag	accttgcatg	cagaccctgg	ggacgaccct	gggaccccca	720
gccccagccc	tgaggttatc	cgtctgctga	agaccctctt	ggtacagctg	cctgactcta	780
actacaacac	cctgcggcac	ctggtggccc	atctgttcag	ggtggctgca	cgatttatgg	840
aaaacaagat	gtctgccaac	aacctgggca	ttgtgtttgg	gccgacactg	ct	892

<210> 168  
 <211> 394  
 <212> DNA  
 <213> Homo sapiens

<400> 168						
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gagcttgaca	gtgaacgtgt	gtctgcattt	cttgtcactg	agaccctggg	gttctatttg	120
ttctgtctcc	ttgcagatga	aacctcgtg	ccaccagatg	ttccaagcta	cctctcttct	180



caggggaccc	tttctgaccg	acaagaaacc	gtggtcagga	ccgaggggtg	ccctcaggcc	240
aatgggcaca	ttgagagcaa	tggtaaggcc	tcagtaaccg	tgaagcagag	ctctgctgtg	300
actgtgtctc	tgggtgctgg	aggtggcctc	caggtcttta	cagggcaggt	acctggcatt	360
agatggggca	aacttggtga	agcccacgcg	tccg			394

<210> 169  
 <211> 550  
 <212> DNA  
 <213> Homo sapiens

<400> 169						
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acccggtttt	ccccgtggcc	ccccgcctcc	tcccggcttc	gctccttttc	atgtgagcat	120
ctgggacact	gatctctcag	accccgctgc	tccggctgga	gaatagatgg	ttttgtgaaa	180
aattaaacac	cgccctgaag	aggagccccg	ctgggcagcg	gcaggagcgc	agagtgtctg	240
cccaggtgct	gcagaggtgg	cgctctcccg	gcccgggacg	gtagccccgg	gcgccaacgg	300
catgacagac	tccgcgacag	ctaaccggga	cgacagggac	cccagatcg	agctctttgt	360
gaaggctgga	atcgatggag	aaagcatcgg	caactgtcct	ttctctcagc	gcctcttcat	420
gacctctctg	ctgaaaggag	tcgtgttcaa	tgtcaccact	gtggatctga	aaagaaagcc	480
agctgacctg	cgcaacctag	cccccggaac	gcacccgccc	tttctggcct	tcaactggta	540
cgtgaagaca						550

<210> 170  
 <211> 422  
 <212> DNA  
 <213> Homo sapiens

<400> 170						
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aatgaaacca	caggggaaag	gggggacttt	ccgggaactt	acgtagaata	tattggaagg	120
aaaaaaatct	cgctctccac	accaaagccc	cgccacacct	ggcctcttcc	tgttgacca	180
ggttcttcga	aaactgaagc	agatgttgaa	caacaagtgc	tctacaagta	tagaaagaag	240
ccttctctct	cccaccgtcc	ccagacacca	cataatggaa	aaagcaagaa	ttttctgcat	300
aagcaaggcc	ttaaaaaaaaa	aaaagccagc	ctctgatggg	acttttttcc	tgccaaaaat	360
cccactggtc	cactgtcgca	atttttacia	aaggccacga	taaaagagta	aggcccattt	420
tg						422

<210> 171  
 <211> 1042  
 <212> DNA  
 <213> Homo sapiens

<400> 171

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ggcaaggaag	tatgggatta	tgtgacggtc	cgcaaggatg	cctacatgtt	ctgggtggctc	180
tattatgcca	ccaactcctg	caagaacttc	tcagaactgc	ccctggtcac	gtggcttcag	240
ggcgggtccag	gcggttctag	cactggattt	ggaaactttg	aggaaattgg	gccccttgac	300
agtgatctca	aaccacggaa	aaccacctgg	ctccaggctg	ccagtctcct	atttgtggat	360
aatcccgtgg	gcactgggtt	cagttatgtg	aatggttagtg	gtgcctatgc	caaggacctg	420
gctatggtgg	cttcagacat	gatgggtctc	ctgaagacct	tcttcagttg	ccacaaagaa	480
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gttgcccttg	gtgattcctg	gatctccctt	gttgattcgg	tgctctcctg	gggaccttac	660
ctgtacagca	tgtctcttct	cgaagacaaa	ggtctggcag	aggtgtctaa	ggttgcagag	720
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gcagaaatga	tcattgaaca	ggtaaaaagg	ggaaacactc	agaggcgagc	ctgcttggct	840
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ttcccacata	tctgcaaatg	attgcatgct	ggataataaa	tctcttgggt	ctaagcagtg	960
atgtagtggc	tccttacaga	gtcagaaagc	caccagggc	tgcaagactt	gcttgtcctt	1020
cactaaatgt	aaaaattcta	tt				1042

<210> 172  
 <211> 890  
 <212> DNA  
 <213> Homo sapiens

<400> 172

aaagtagtag	gttggtgcaa	acgtagtaat	aaattggttt	ggccctgttt	tcatagaact	60
atagagggtg	gacctttgtc	cccttcacga	tgcctacaaa	caaactgatg	tttttgattt	120
ttttttcttt	ttaaaatttt	gttgccacta	attcttataa	aaatcctcac	acaaggctgg	180
gctcagtggt	tcacacctgt	aatcccagca	ctttgggagg	ctgaggcagg	cggatcacga	240
ggtcaggaga	tcgagaacct	cctggctaac	acggtgaaac	ccccgtctct	actaaaaata	300
caaaaaaatt	agccgggcgt	ggtggcgggc	gcctgtagtc	ccagctactc	gggaggctga	360
ggcaggagaa	tggcgtgaac	ccgggaggca	gagcttgtag	tgagccgaga	tagcgccact	420
gcactccagc	ctgggcgaca	gagcaagact	ccatctcaaa	aaaaaaaaaa	agtgataata	480
ctgtaatccc	agcacttttg	gaggccgagg	caggcggatc	acgaggtcag	gagatcgaga	540
ccatcctggc	taacacgggt	aaaccccgct	tctactaaaa	atacaaaaaa	ttagctgggc	600
gtgggtggcg	gcacctgtag	tcccagctac	ctgggaggct	gaggcaggag	aatggcgtag	660
accaggagg	cggagcttgc	agtgagcgga	gatcatgcca	ctgcacttca	gcctgggcga	720
cagagcaaga	ctccatctca	aaaaacacac	acacacacac	acacacacac	acacacacaa	780
atagaaaaat	aataatagtt	ttaagcacct	ctaaagtaca	gatattgtgc	caagcaattt	840
atgtgaattg	attagattga	taactctaaa	aatagtttcc	ctaatcaact		890

<210> 173  
 <211> 1922  
 <212> DNA  
 <213> Homo sapiens

<400> 173

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tcataaattg	cttcatcaaa	ctcatcaaat	ctgtagctta	tacatttcct	tgttcttggt	180
gacctctttt	caaagcaagt	ttgctttgga	tttttttgaa	tcttttttct	tttcttcttg	240
atcttcagaa	aagtctggct	ctttgtggag	gaatgatgtt	ttcaatactg	gataccaaca	300
tacaccaagc	gttcttttcc	ttcgttccgg	caacgctctt	tccttcttta	aggcaacatc	360
ccaaatcctg	gaaactgggtc	ctctaatttt	tccaacaaga	gcaagttaa	tgttgggcaa	420
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ccttttcttc	ctcctcttct	gaagctgcag	atgatttttc	actgccagac	ccttcacttt	660
catcattgct	ggaatatctt	catctgccac	gtgtccgaga	accagtccat	cgaactttgc	720
ccttggtgtt	taccttgctt	actttagaat	ttgtatcttt	ctctgatttt	ttcaaaattt	780
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tctcttgctt	gttttctggt	tctagaactt	tggggggaga	atcgggcttc	tttttccgac	1020
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ccatttctac	cctttgtgaac	tcagaatcct	ccttttaggg	ttctaggtct	acttttttca	1260
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caggcttttc	tgactctaga	gtactctttg	gaacttcttc	tggtattgga	ctcaatcttt	1440
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cacctgtttt	catacttggt	tatgacagaa	tttaaggact	ctgttccatt	tccctccgtg	1800
atgatatttc	tgtccttagg	ggggctatag	ctctcttctt	ttgtctcata	aaactttgtc	1860
tctacttggt	tctgtcttaa	aatttgagac	taccctttca	tcactaactt	ctccattttac	1920
ca						1922

<210> 174  
 <211> 537  
 <212> DNA  
 <213> Homo sapiens

<400> 174

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acagttcttt	acagaaaaaca	cctgtttgga	aaggcaggaa	tacaagctct	gctgtggaaa	180
tgcttttcag	aaattcaaaa	cgaagtcgac	ttttttctga	tgaagatgat	aggcaaataa	240
atacaaggtc	acctaaaaga	aaccagaggg	ttgcaatggg	tccacagaaa	tttacagcaa	300
caatgtcaac	accagataag	aaagcttcac	agaagattgg	ttttcgatta	cgtaatctgc	360
tcaagcttcc	taaagcacat	aatgggtgta	tatacgagtg	gttctattca	aatatagata	420
aaccactttt	tgaagggtgat	aatgactttt	gtgtatgtct	aaaggaatct	tttcttaatt	480
tgaaaacaag	aaagttaaca	agagtagaat	ggggaaaaat	tcggcggctt	atgggaa	537

<210> 175  
 <211> 659  
 <212> DNA  
 <213> Homo sapiens  
  
 <220>  
 <221> misc\_feature  
 <222> (1)...(659)  
 <223> n = a,t,c or g

<400> 175  
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 gctacgggca tttctgtatc agcttatgaa cttaatggct tgttttctgt gctgatgttg 120  
 gcctgggtct tcctacccat ctacattgct ggtcagggtca ccacgatgcc agaataccta 180  
 cggaagcgct tcggtggcat cagaatcccc atcatcctgg ctgtactota cctatttatc 240  
 tacatcttca ccaagatctc ggtagacatg tatgggggtg ccattctcat ccagcagtct 300  
 ttgcacctgg atctgtacct ggccatagtt gggctactgg ccattcactgc tgtatacacg 360  
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 aaggagaagt acttcttggc cctggctagc aaccggagtg agaacagcag ctgcgggctg 540  
 ccccggaag atgcctttca tatttttcca gatccgctga catctgatct cccgtggcgg 600  
 ggggtcctat ttggaatgtc catcccatcc ctctggtact ggngcacgga tcaggtgaa 659

<210> 176  
 <211> 1033  
 <212> DNA  
 <213> Homo sapiens  
  
 <220>  
 <221> misc\_feature  
 <222> (1)...(1033)  
 <223> n = a,t,c or g

<400> 176  
 cccacgcgtc cggatgtgtg ctacacttgg ggggacctga ttggggcttc agaccttggg 60  
 ggctgtccg caggggtctcc tccatccttc ttgatttgcc tgcattgag gctgcccgtc 120  
 ctgggcgcca tccccagcc taacacctct tctcagtctt tccttgcagg tccttgaggt 180  
 ccaggccttg gggcagtga gaaaccgtgg ggaggggcat gagatgccag tccccaaagt 240  
 ccttgggagc ccttgtgggc caagtcatgt taggacacac cctctcctgg gcattgctga 300  
 ggtcaccagc tgagcctagg ctccccctc ctcccatccc cagcctgggg gaaccttcag 360  
 cgtctctcct ccctgtaggc cccggctcag ctccccagga acttttgttg gtgggtacta 420  
 gtagggttaag gcagttcttc ccatcatgag ggagaccttg ggagacttcc attaccaaatt 480  
 ccattgctgc cccgaccttc ctgggactga tctgggtcac cctggtctcc tgatcttggg 540  
 gaagtcaagt tcttatccca gacttgagag gttacaagcc tccaggtctc tggcaaagtg 600  
 tggagatgat ggacagccat ttgtacacac accagccagt cccttagcat atctctcttg 660  
 gttttgtctc aggtctgcct cagccacctc cctgacgctg tccactgtg tggatgtggg 720  
 gaaggggctt ctggatttta agaagaggag aggtcactca attgggggag cccctgagca 780  
 gcgataccag atcatccctg tgtgtgtggc tgcccgaact cctaccgggg ctgaggtgt 840  
 gctgcagcct cctggccact ggaggggctg accgcctgat ccacctctgg aatgttgtgg 900  
 gaagtcgcct ggagggccaac cagaccctgg agggagctgg tggcagcatc accagtgtgg 960  
 actttgacct ctggggctac caggttttag cagcaactta caaccagggt gccccagtttt 1020  
 ggaaggtngg gga 1033

<210> 177  
 <211> 335  
 <212> DNA  
 <213> Homo sapiens

<400> 177  
 gtcaaaaacg atttcctagc aactgtggcc gtgatggaaa actgtttctt tggggacaag 60  
 cacttcatat catcgcaaaa ctccctgggt agtggagaag attgggaatg gtatTTTTTT 120  
 ccttggtatt aagctattag aaataaatat gcctttgctg gcacataata gtacttttgt 180  
 acaacaggat atcctatgga gtttaaaaat aagtatttaa aatataacaa atctgtatta 240  
 gtccattctc atgctactaa taaagatata cccaagactg ggtaatttat aaaggaagga 300  
 gttttaatgg cctcacagtt ccgtcgacgc gggcg 335

<210> 178  
 <211> 556  
 <212> DNA  
 <213> Homo sapiens

<220>  
 <221> misc\_feature  
 <222> (1)...(556)  
 <223> n = a,t,c or g

<400> 178  
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 caggaactgg gggtcggga gcgcagtggc cacagcgtgt cctcatcga cctctggggc 120  
 ctccctgttg agtatctcct gtaccaggag gagaaccctg ccaagctgtc tgaccaacag 180  
 gaggcgggtc gccagggtca gaacccttac cccatttaca ccagtgtcaa cgtccgcacc 240  
 aacttgagtg ggggaagattt tgcagagtgg tgcgagttca cgccctatga ggttggttc 300  
 cccaagtacg gggcttatgt tcccaccgag ctcttcggct cagaactctt catgggacga 360  
 ttgctgcagc tccagcctga accccggatc tgttacctgc aaggatgtg gggcagcgcc 420  
 tttgccacca gcctggatga gatcttccta aagaccgccg gctcgggcct cagcttcctg 480  
 gagtggatca gaggcagtgt gaatatcaca gacgactgcc agaagcctca gctgcacaa 540  
 ncctcgacgc gggaat 556

<210> 179  
 <211> 631  
 <212> DNA  
 <213> Homo sapiens

```

<400> 179
gaatttctgg gtcgtccac gcggtccgca aaggatgagg gaaacgatga gggaaaggat 60
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gagagaaaagg atgagggaaa ggatgaggga aaggatgaga gaaaggatga gggaaaggat 180
gagggaaaagg atgagggaaa ggatgaggga aaggatgagg gaaaggatga gggaaaggat 240
gagggaaaagg atgagggaaa cgatgaggga aaggatgagg gaaaggatga gggaaaggat 300
gagggaaaagg atgagggaaa ggatgaggga aaggatgagg gaaacgatga gggaaacgat 360
gagggaaaagg atgagggaaa ggatgaggga aaggatgaga gaaacgatga gggaaaggat 420
gagggaaaagg atgagggaaa ggatgaggga aaggatgaga gaaacgatga gggaaaggat 480
gagagaaaagg atgagggaaa ggatgaggga aaggatgagg gaaaggatga gggaaaggat 540
gagggaaaagg atgagggaaa cgatgaggga aaggatgaga gaaaggatga gggaaaggat 600
gagggaaaagg atgagggaaa ggataagtaa g 631

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<210> 180
<211> 469
<212> DNA
<213> Homo sapiens

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<220>
<221> misc_feature
<222> (1)...(469)
<223> n = a,t,c or g

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<400> 180
ggcggggctc ntttgagacc tgatgaccat cattacgccc agcttggcac gagggggagg 60
acttcagcta cggcctgcag ccctactgcg ggtactcctt ccagggttggt ggggagatga 120
tccggaaccg ggaggtgctg ccttgccccg atgactgtcc cgcttgggag tatgcctca 180
tgatcgaggg ctggaacgag ttccccagcc ggagggcccg ctttaaggac atccacagcc 240
ggctccgagc ctggggcaac ctttccaact acaacagctc ggagcagacc tcgggggggca 300
gaaacaccac gcagaccagc tccttgagca ccagccact gtgcaatgtg agcaacgccc 360
cctacgtggg gcccaagcag aaggtcccg cctttccaca gacccaggtc atccccatga 420
agggccagat cagacccatg gtgcccccg cgcagctata cgtccccgg 469

```

```

<210> 181
<211> 453
<212> DNA
<213> Homo sapiens

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```

<400> 181
caggaattcc gggcgccacc cacgcgttcg atggatcctg gaagagcgca agcgggtgat 60
gcaggaggcc tgcgccaagt accgggcgag cagcagccgc cgggcggtca cggcccgcca 120
cgtgtcccgat atcttcgtgg aggaccgcca ccgcgtgctc tactgcgagg tgcccaaggc 180
cggctgctcc aattggaagc ggggtgctcat ggtgctggcc ggccctggcct cgtccactgc 240
cgacatccag cacaacaccg tccactatgg cagcgtctc aagcgcctgg acaccttcga 300
ccgccagggt atcttgacc gtctcagcac ctacaccaag atgctctttg tccgcgagcc 360
cttcgagagg ctgggtgtccg ccttcgcgca caagtttgag caccccaaca gctactatca 420
cccggctctc tgcattggcca tactggcccc gta 453

```

<210> 182  
 <211> 377  
 <212> DNA  
 <213> Homo sapiens

<400> 182  
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 agtcaaggat gatgtgaact tggatacagt acttctccta ccctttttga aagaaatagc 120  
 agtaagccaa ctggatcaac tgagcccaga ggaacagttg ctggatcaagt gtgctgcaat 180  
 cattgggtcac tccttccata tagatttgct gcagcacctc ctgcctggct gggataaaaa 240  
 taagctactt caggtcttga gagctcttgt ggatatacat gtgctctgct ggtctgacaa 300  
 gagccaagag cttcctgctg agcccatatt aatgccttcc tctatcgaca tcattgatgg 360  
 aaccaaagag aagaaga 377

<210> 183  
 <211> 621  
 <212> DNA  
 <213> Homo sapiens

<400> 183  
 ctcatcctta aagtgcagaga gtaaattaac tctaaggccc catccaggac tcaagctgtg 60  
 tgattttaca aaaatgaaaa ttatattaat aatcccattg taaaatccca aaagaaagtc 120  
 aagagactag cagaaagaca ggtgggtgat gggatgtcct ggacagagcc tggatcatga 180  
 ggtccccatg tagtgcttgt actacgcaga tgtttcctct tgagctatct taaaggtgtg 240  
 gaaaaagcca aagcaatgcc ctctccacgg atactaaaga ctacaccttc cactcagctg 300  
 ctgccaccgt ctttctggga aaacaactgc aaggttaagat accaacagct ccctgtgaca 360  
 gaagggaaag taagccaacc aaagcgagtc ctgcagaccc caacgcagag cattcgtgat 420  
 cacctttgcc tctccactgt ctctgatgct taccagcaaa gagaaaacat aaagttctac 480  
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 aatgtttgga gggaactaga gacatgggga ggcagtgagt gcagtaagcg tagctgtgaa 600  
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 <212> DNA  
 <213> Homo sapiens

<400> 184  
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agaagtattt	cctttccttt	taacatgaaa	gcaattcaat	ataatccaaa	tgtgtaaatg	360
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 <212> DNA  
 <213> Homo sapiens

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aatctcacta	gcacatgtca	aagagccagg	agaggcacia	ttaccaagc	agaggaagaa	300
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 <212> DNA  
 <213> Homo sapiens

<400> 186						
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 <212> DNA  
 <213> Homo sapiens

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 <211> 1080  
 <212> DNA  
 <213> Homo sapiens

<400> 188						
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 <212> DNA  
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 <212> DNA  
 <213> Homo sapiens

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<210> 191  
 <211> 562  
 <212> DNA  
 <213> Homo sapiens

<400> 191						
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<210> 192  
 <211> 2171  
 <212> DNA  
 <213> Homo sapiens

<400> 192						
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 <212> DNA  
 <213> Homo sapiens

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 <212> DNA  
 <213> Homo sapiens

<400> 194

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 <211> 423  
 <212> DNA  
 <213> Homo sapiens

<400> 195

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aac						423

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 ccccaagtag ttgtgcctcc taggcacaca acactatgcc ccggcaaatt tttttgtatt 180  
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 cctgctcaac caggttttat tatttaagtt agttaaaactt tggatagatt gtataatata 360  
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 <212> DNA  
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 gccaggccgc tgggagcaca ggacttgtcg gcagctgtct cacctgaagg accagtgtct 480  
 gatcagctgc tgcgtgctca gcccagagc aggtgaggca cgtggccagc atgggagggc 540  
 tgcagccagc gtgcccccca ctgccaggcc tcaggcacac tgtagctttt tatgtgactg 600  
 gctacacagc cctgtcagga ctaagtggga agaagtaagc ttgttctcaa ggggtgggtgc 660  
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<210> 198  
 <211> 636  
 <212> DNA  
 <213> Homo sapiens

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 gcgggcccga agggttcgac aaacgtcgct ggcagattgt gaaccagaac gatcgtcagg 180  
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 <212> DNA  
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gacagtcaag	ggttatgtca	gaaaaggatg	agtatcagtt	tcaacatcag	ggagcggtagg	180
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<210> 200  
 <211> 433  
 <212> DNA  
 <213> Homo sapiens

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<210> 201  
 <211> 782

<212> DNA  
<213> Homo sapiens

<220>  
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<222> (1)...(782)  
<223> n = a,t,c or g

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gcagtttctt tttgggagag ctagttagtc ccacagagtg gtatccctag aaggggagaag      180
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gtctgctcta ttttcttttc tctctctgga gctgagagtc agagggccct tctcctcctc      300
ctttcagccc ccaacactaa gctgatggat tgataaatac ctccagccct cgcctttctc      360
aaccacacct gcaagtcttc ttaggatctg atcccagttt tctggaagca atcctacccc      420
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ccagcctagt gggctttctc ctctgtctct ccggtggccc caggcaatcg actgcatcac      660
gcanggacgt gagttggagc ggccacgtgc ctgccacca gaggtctacg ccatcatgcc      720
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ca
ca

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<210> 202  
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<212> DNA  
<213> Homo sapiens

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gatctgttga acctgggagc agagcccaat gccgctgacc atcagggacg ttcggtcttg      300
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gtccggggag tccaggcaaa tgctgacttt gcctcttcct tgctgcgtgc ccttgaacat      660
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<210> 203  
<211> 477  
<212> DNA  
<213> Homo sapiens



&lt;400&gt; 203

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&lt;210&gt; 204

&lt;211&gt; 706

&lt;212&gt; DNA

&lt;213&gt; Homo sapiens

&lt;400&gt; 204

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&lt;210&gt; 205

&lt;211&gt; 852

&lt;212&gt; DNA

&lt;213&gt; Homo sapiens

&lt;400&gt; 205

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 <212> DNA  
 <213> Homo sapiens

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c						361

<210> 207  
 <211> 2483  
 <212> DNA  
 <213> Homo sapiens

<400> 207						
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 <212> DNA  
 <213> Homo sapiens

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cccttgggga	gcagccccag tttctgggag tcagggaaca gagagtaacc ggcacatcgc 300
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gaatagttaa	ggtgcattct	ccatccacaa	tcacgtggca	gacaatgtgt	tgctggaaaa	540
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<210> 210  
 <211> 383  
 <212> DNA  
 <213> Homo sapiens

<220>  
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 <222> (1)...(383)  
 <223> n = a,t,c or g

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<210> 211  
 <211> 592  
 <212> DNA  
 <213> Homo sapiens

<400> 211						
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<210> 212  
 <211> 2166  
 <212> DNA

&lt;213&gt; Homo sapiens

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caagtatgtc aacaagtttg ccttgtctt cctgggttgt gtcatcctct ccatacctggc      360
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catgag

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&lt;210&gt; 213

&lt;211&gt; 392

&lt;212&gt; DNA

&lt;213&gt; Homo sapiens

&lt;220&gt;

&lt;221&gt; misc\_feature

&lt;222&gt; (1)...(392)

&lt;223&gt; n = a,t,c or g

&lt;400&gt; 213

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 <212> DNA  
 <213> Homo sapiens

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agcgggtccag	ttggacagac	ttggtgctaa	ctggctaggt	gaacttgagc	aagatttagc	360
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ctgct						425

<210> 215  
 <211> 608  
 <212> DNA  
 <213> Homo sapiens

<400> 215						
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<210> 216  
 <211> 858  
 <212> DNA

&lt;213&gt; Homo sapiens

<400> 216

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aacgttgctc	taattccata	tagcgccac	tttttacatc	ttcatctatg	acagattgaa	300
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agtgggcgct	atatggaatt	agagcaacgt	tacatggacc	tcgctgagaa	tgcccgtttt	420
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aatgaaaagc	agaaagtggc	agagctgtat	tctatccata	actctggaga	caaactctgat	720
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agcttgcagg	aagatctggc	tcatacccg	aatgatgcca	atcgattaca	ggatgccatt	840
gctaaaggta	gaggatga					858

&lt;210&gt; 217

&lt;211&gt; 399

&lt;212&gt; DNA

&lt;213&gt; Homo sapiens

<400> 217

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caccaccacc	gtcgccacaa	ctactacaac	cactgctgcc	gccaccacca	ccacggagag	300
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atggaacgctc	acggtgctcc	ccaacagtaa	atggggccaa			399

&lt;210&gt; 218

&lt;211&gt; 662

&lt;212&gt; DNA

&lt;213&gt; Homo sapiens

<400> 218

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cg						662

<210> 219  
 <211> 752  
 <212> DNA  
 <213> Homo sapiens

<400> 219						
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cggctgtgca	gtggccctgg	gagatccata	agtggctcaa	ttccagctgg	acggactgtc	660
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<210> 220  
 <211> 582.  
 <212> DNA  
 <213> Homo sapiens

<400> 220						
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gccaccacgc	ttggccctgc	ccaggagtca	tttttgtatc	tacaggatcc	ttcctatgct	180
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gggcacttta	aagccctttc	acctgccaa	tcacgaagca	cccctatagt	tgtgtttgta	420
aaatactggg	gggtttgaag	gggaaaagg	ataactccaa	ggtaaccatc	ttgcatttca	480
gatccacaca	acttaaagat	ctgctgtcga	gtgaatgggg	aagtgggtcca	gagcagcaac	540
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<210> 221  
 <211> 440  
 <212> DNA  
 <213> Homo sapiens

<400> 221  
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 tccaaaacaa tctaattaag tgctagaagt ttgccatgga cagacaaagt gctacttggg 180  
 aaggaagtcc cagaaacacc acagctgggt acattcttca ccactctgag tgggtggcagt 240  
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 gaaatgcgcc agttagctct 440

<210> 222  
 <211> 489  
 <212> DNA  
 <213> Homo sapiens

<400> 222  
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 gcccgccacg gacgcctcag cttgcaacca tggtaacgtt tctggcgggg gacacccccg 180  
 ggagcccacc gcgatgggca gcctcctgggt gactgatgga cgagtgtcca cctcccagac 240  
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 caattttgat gaaccaaaga agaattcgtg ggtttcatcc tctccgtgcc agctgagccc 420  
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 gattcttgg 489

<210> 223  
 <211> 493  
 <212> DNA  
 <213> Homo sapiens

<400> 223  
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<210> 224  
 <211> 883  
 <212> DNA  
 <213> Homo sapiens

<400> 224						
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acaattcaga	ctgctgccag	aattgttcct	gaagagcctt	ctgattcaga	gaaggatttg	240
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gaaagaatgt	ttaatagact	ccaggaaca	tgttcaaag	gacttaatgt	tctcaagcaa	840
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<210> 225  
 <211> 389  
 <212> DNA  
 <213> Homo sapiens

<400> 225						
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<210> 226  
 <211> 412  
 <212> DNA  
 <213> Homo sapiens

<400> 226  
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<210> 227  
 <211> 390  
 <212> DNA  
 <213> Homo sapiens

<400> 227  
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<210> 228  
 <211> 777  
 <212> DNA  
 <213> Homo sapiens

<400> 228  
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 <213> Homo sapiens

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